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DRAFT STAFF REPORT

**REVISED CALIFORNIA ENERGY
DEMAND FORECAST 2012-2022**
**Volume 2: Electricity Demand by
Utility Planning Area**



CALIFORNIA
ENERGY COMMISSION

Edmund G. Brown Jr., Governor

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ABSTRACT

The *Revised California Energy Demand Forecast 2012-2022* describes the California Energy Commission staff's revised forecasts for 2012–2022 electricity consumption, peak, and natural gas demand for each of five major electricity planning areas and three natural gas distribution areas and for the state as a whole. This forecast supports the analysis and recommendations of the 2011 and 2012 *Integrated Energy Policy Reports*. The forecast includes three full scenarios: a *high energy demand* case, a *low energy demand* case, and a *mid energy demand* case. The *high energy demand* case incorporates relatively high economic/demographic growth, relatively low electricity and natural gas rates, and relatively low efficiency program and self-generation impacts. The *low energy demand* case includes lower economic/demographic growth, higher assumed rates, and higher efficiency program and self-generation impacts. The *mid* case uses input assumptions at levels between the *high* and *low* cases.

Keywords

Electricity, demand, consumption, forecast, weather normalization, peak, natural gas, self-generation, conservation, energy efficiency

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EXECUTIVE SUMMARY

Introduction

The California Energy Commission staff report, *Revised California Energy Demand Forecast 2012-2022 (CED 2011 Revised)* forecasts electricity and end-user natural gas consumption and peak electricity demand for the State of California and for each major utility planning area within the state for 2012-2022. *CED 2011 Revised* supports the analysis and recommendations of the 2011 *Integrated Energy Policy Report (2011 IEPR)*, and 2012 *Integrated Policy Report Update (2012 IEPR Update)*, including electricity and natural gas system assessments and analysis of progress towards increased energy efficiency and provides detail on the impacts of energy efficiency programs and standards, continuing a major staff effort to improve the measurement and attribution of efficiency impacts within the energy demand forecast.

CED 2011 Revised includes three full scenarios: a *high energy demand* case, a *low energy demand* case, and a *mid energy demand* case. The *high energy demand* case incorporates relatively high economic/demographic growth, relatively low electricity and natural gas rates, and relatively low efficiency program and self-generation impacts. The *low energy demand* case includes lower economic/demographic growth, higher assumed rates, and higher efficiency program and self-generation impacts. The *mid* case uses input assumptions at levels between the *high* and *low* cases.

This report is organized into two volumes. Volume 1 examines electricity and end-user natural gas consumption as well as peak electricity demand for the State of California as a whole. Also, Volume 1 describes key aspects of the method used to produce the forecast, including economic and demographic assumptions; historical consumption estimates; electricity and natural gas rate projections; conservation and efficiency impacts; and demand response, distributed generation, and electric vehicle considerations. Volume 2 presents forecasts of electricity consumption and peak electricity demand for each of five utility planning areas: Los Angeles Department of Water and Power, Pacific Gas & Electric, Southern California Edison, San Diego Gas & Electric, and Sacramento Municipal Utility District.

Electricity Forecast Results

Each chapter in Volume 2 describes electricity forecast results for a particular utility planning area. Forecasts of total consumption and peak loads lead into a discussion of per capita values, load factors, key economic and demographic drivers, and individual sector results. Demand impacts due to electric vehicles, distributed generation, conservation, and energy efficiency are considered at the end of each chapter. For each result, the *CED 2011 Revised* values are presented alongside the adopted *CED 2009* forecast, accompanied by an explanation of any significant differences between the two.

Pacific Gas & Electric

Chapter 1 describes the Pacific Gas & Electric (PG&E) planning area and forecast results. Notable features of the PG&E forecast include the following.

- Electricity consumption and peak demand are lower than *CED 2009* levels due primarily to the recent economic downturn, causing 2010 recorded consumption to be lower than projected. Both electricity consumption and peak demand grow at rates similar to what was seen in *CED 2009*.
- The PG&E planning area experienced relatively mild temperatures in 2011 such that the weather-normalized peak load is higher than the recorded peak value. This higher, adjusted value is the basis of the peak forecast.
- Historical estimates of population were adjusted to agree with the 2010 U.S. Census. For PG&E, this translated to a lower population projection than seen in *CED 2009* and, consequently, higher projections of per capita consumption and per capita peak demand.
- Self-generation is expected to reduce peak demand in the PG&E planning area by nearly 1,500 megawatt (MW), more than 600 MW of which is due to photovoltaic systems.
- Electric vehicles are expected to increase electricity consumption by nearly 1,500 Gigawatt hours (GWh) in 2022.

Southern California Edison

Chapter 2 describes the Southern California Edison (SCE) planning area and forecast results. Notable features of the SCE forecast include the following.

- Electricity consumption and peak demand are lower than *CED 2009* levels due primarily to the recent economic downturn, causing 2010 recorded consumption to be lower than projected. Electricity consumption grows at lesser rate than seen in *CED 2009*.
- The SCE planning area experienced relatively normal weather in 2011.
- Historical estimates of population were adjusted to agree with the 2010 U.S. Census. For SCE, this translated to a lower population projection than seen in *CED 2009* and, consequently, higher projections of per capita consumption and per capita peak demand.
- Self-generation is expected to reduce peak demand in the SCE planning area by nearly 1,400 MW, more than 550 MW of which is due to photovoltaic systems.
- Electric vehicles are expected to increase electricity consumption by nearly 1,500 GWh in 2022.

San Diego Gas & Electric

Chapter 3 describes the San Diego Gas & Electric (SDG&E) planning area and forecast results. Notable features of the SDG&E forecast include the following.

- Electricity consumption is lower in 2010 than projected by *CED 2009* but grows at a higher rate. Increased growth in the SDG&E planning area is driven in part by higher projections of population, income, and manufacturing output.
- The SDG&E planning area experienced relatively normal weather in 2011. Increased growth in the peak demand forecast relative to *CED 2009* is driven primarily by higher growth in consumption and incremental climate change considerations.
- Self-generation is expected to reduce peak demand in the SDG&E planning area by more than 300 MW, nearly 200 MW of which is due to photovoltaic systems.
- Electric vehicles are expected to increase electricity consumption by nearly 400 GWh in 2022.

Sacramento Municipal Utility District

Chapter 4 describes the Sacramento Municipal Utility District (SMUD) planning area and forecast results. Notable features of the SMUD forecast include the following.

- Electricity consumption is lower than *CED 2009* levels due primarily to the recent economic downturn, causing 2010 recorded consumption to be lower than projected. Consumption grows at a rate similar to what was seen in *CED 2009*.
- The SMUD planning area experienced relatively mild temperatures in 2011 such that the weather-normalized peak load is higher than the recorded peak value. This higher, adjusted value is the basis of the peak forecast.
- Self-generation is expected to reduce peak demand in the SMUD planning area by nearly 40 MW, most of which is due to photovoltaic systems.
- Electric vehicles are expected to increase electricity consumption by nearly 150 GWh in 2022.

Los Angeles Department of Water and Power

Chapter 5 describes the Los Angeles Department of Water and Power (LADWP) planning area and forecast results. Notable features of the LADWP forecast include the following.

- Electricity consumption is lower than *CED 2009* levels due primarily to the recent economic downturn, causing 2010 recorded consumption to be lower than projected.
- Peak demand grows at a significantly higher rate than what was seen in *CED 2009*, due in part to increasing saturation of air conditioning in the residential sector as well as higher projected growth in households and commercial floor space.

- The LADWP planning area experienced relatively mild temperatures in 2011 such that the weather-normalized peak load is higher than the recorded peak value. This higher, adjusted value is the basis of the peak forecast.
- Self-generation is expected to reduce peak demand in the LADWP planning area by roughly 270 MW, of which about 50 MW is due to photovoltaic systems.
- Electric vehicles are expected to increase electricity consumption by nearly 400 GWh in 2022.

CHAPTER 1: Pacific Gas & Electric Planning Area

The Pacific Gas & Electric (PG&E) planning area includes:

- PG&E bundled retail customers,
- Customers served by energy service providers (ESPs) using the PG&E distribution system to deliver electricity to end users.
- Customers of publicly owned utilities and irrigation districts in PG&E's transmission system, with the exception of Sacramento Municipal Utility District (SMUD). SMUD is treated as its own planning area as discussed in a later chapter.

For purposes of this chapter, the PG&E planning area forecast includes other members of the SMUD control area, which are not in the SMUD service area. These entities include Roseville, Redding, and the Western Area Power Administration (WAPA).

To support electricity and transmission system analysis, staff uses historical consumption and load data to develop individual forecasts for all medium and large utilities in the planning area. Those results are presented in Forms 1.5a through 1.5c in the statewide forms accompanying this forecast report. The results in this chapter are for the entire PG&E transmission planning area.

This chapter is organized as follows. First, forecasted consumption and peak loads for the PG&E planning area are discussed; both total and per capita values are presented. The *CED 2011 Revised* values are compared to the adopted *CED 2009* forecast, with differences between the two forecasts explained. The forecasted load factor, jointly determined by the consumption and peak load estimates, is also discussed. Second, the chapter presents sector consumption and peak load forecasts. The residential, commercial, industrial, and "other" sector forecasts are compared to those in *CED 2009*, and differences between the two are discussed. Third, the chapter discusses the forecasts of electric vehicles, self-generation, and the impacts of conservation and efficiency programs.

Forecast Results

For this forecast, three demand scenarios were developed. The high demand scenario includes high economic and demographic projections, low energy price projections and low efficiency impact assumptions. The low demand scenario included low economic and demographic projections, high energy price projections and high efficiency impact assumptions. Volume 1 provides more detail on the construction of the demand scenarios.

Table 1-1 presents a comparison of the *CED 2011 Revised* high, mid and low demand scenarios with *CED 2009* for electricity consumption and peak demand for selected years.

In the PG&E planning area, the *CED 2011 Revised* mid demand electricity consumption is 2 percent lower than *CED 2009* in 2020. This is primarily a result of the recent economic downturn, causing 2010 recorded consumption to be 1.6 percent lower than was projected in *CED 2009*. The long-term growth rate of the mid demand scenario is nearly identical to that projected by *CED 2009*. The *CED 2011 Revised* high demand level is 3.1 percent higher than *CED 2009* in 2020 while the low demand scenario is 4.5 percent lower. Weather-normalized peak demand in 2011 is 6.3 percent lower than predicted in *CED 2009*, but grows at a faster rate in the mid and high cases from 2011-2020 because of projected economic recovery.

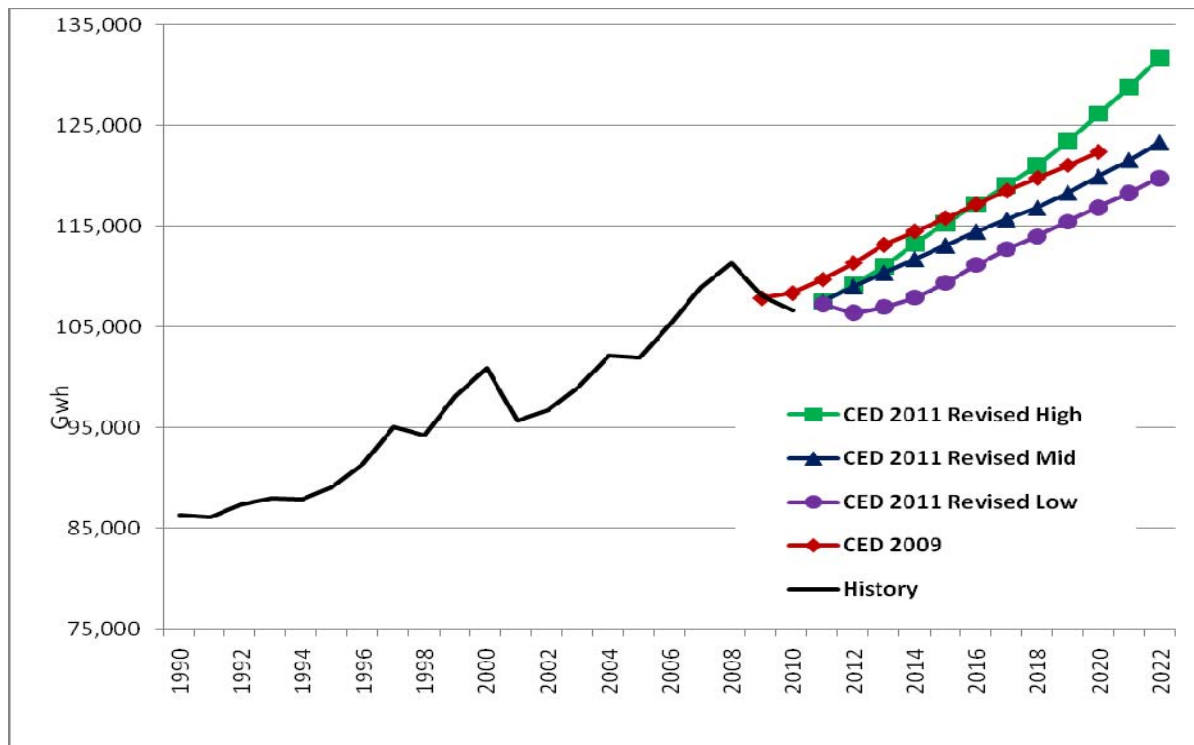
Table 1-1: PG&E Planning Area Forecast Comparison

Consumption (GWh)				
	<i>CED 2009</i> (Dec. 2009)	<i>CED 2011</i> Revised-High	<i>CED 2011</i> Revised-Mid	<i>CED 2011</i> Revised-Low
1990	86,803	86,382	86,382	86,382
2000	101,333	100,907	100,907	100,907
2010	108,344	106,657	106,657	106,657
2011	109,703	107,496	107,603	107,263
2015	115,828	115,282	113,138	109,374
2020	122,414	126,149	119,981	116,895
2022	--	131,731	123,353	119,831
Average Annual Growth Rates				
1990 - 2000	1.56%	1.57%	1.57%	1.57%
2000 - 2010	0.67%	0.56%	0.56%	0.56%
2011 - 2015	1.37%	1.76%	1.26%	0.49%
2011 - 2020	1.23%	1.79%	1.22%	0.96%
2011 - 2022	--	1.87%	1.25%	1.01%
Peak (MW)				
	<i>CED 2009</i> (Dec. 2009)	<i>CED 2011</i> Revised-High	<i>CED 2011</i> Revised-Mid	<i>CED 2011</i> Revised-Low
1990	17,250	17,250	17,250	17,250
2000	20,628	20,628	20,628	20,628
2011	23,810	20,862	20,862	20,862
2011*	23,810	22,303	22,303	22,303
2015	25,163	24,495	24,123	22,986
2020	26,805	26,712	25,709	24,529
2022	--	27,660	26,273	24,912
Average Annual Growth Rates				
1990 - 2000	1.80%	1.80%	1.80%	1.80%
2000 - 2011	1.31%	0.10%	0.10%	0.10%
2011* - 2015	1.39%	2.37%	1.98%	0.76%
2011* - 2020	1.33%	2.02%	1.59%	1.06%
2011* - 2022	--	1.98%	1.50%	1.01%
Historical values are shaded.				
*Weather normalized: <i>CED 2011 Revised</i> uses a weather-normalized peak value derived from the actual 2011 peak for calculating growth rates during the forecast period.				

Source: California Energy Commission, 2012

As shown in **Figure 1-1**, *CED 2011 Revised* electricity consumption forecasts are lower at the beginning of the forecast period than *CED 2009* because of the recent economic downturn, causing a greater than anticipated drop in 2010 consumption. The high demand scenario is also lower through the first half of the forecast period before increasing to a level above *CED 2009* by 2016. Growth in the mid and low scenarios is similar to *CED 2009*, while growth in the high scenario is much greater.

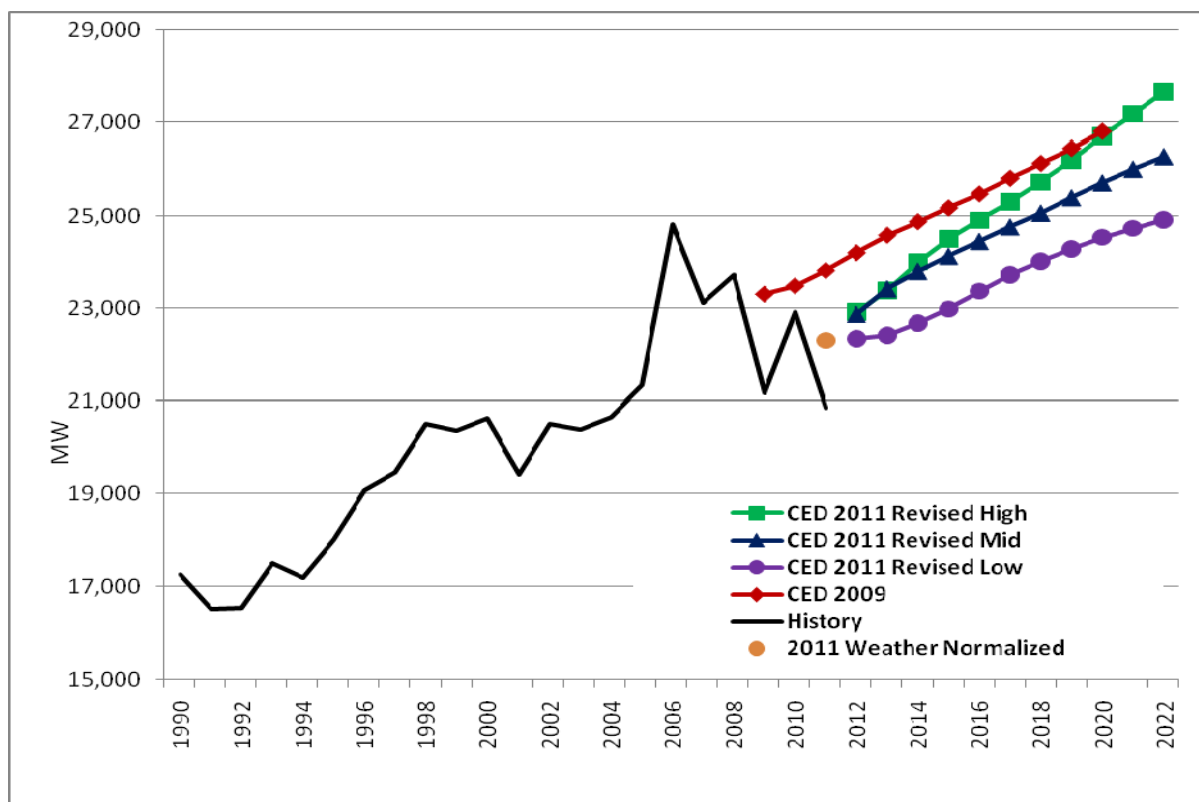
Figure 1-1: PG&E Planning Area Electricity Forecast



Source: California Energy Commission, 2012

The weather-normalized peak value in 2011 is significantly lower than projected by *CED 2009*. As a result, all three of the *CED 2011 Revised* PG&E planning area peak demand forecasts, shown in **Figure 1-2**, are lower than *CED 2009* over the entire forecast period, though the high demand scenario approaches *CED 2009* by 2020. Growth is slightly higher in the peak forecast than in the consumption forecast. This is due in part to efficiency considerations—such as increased lighting efficiency—that have a greater impact on consumption than on peak.

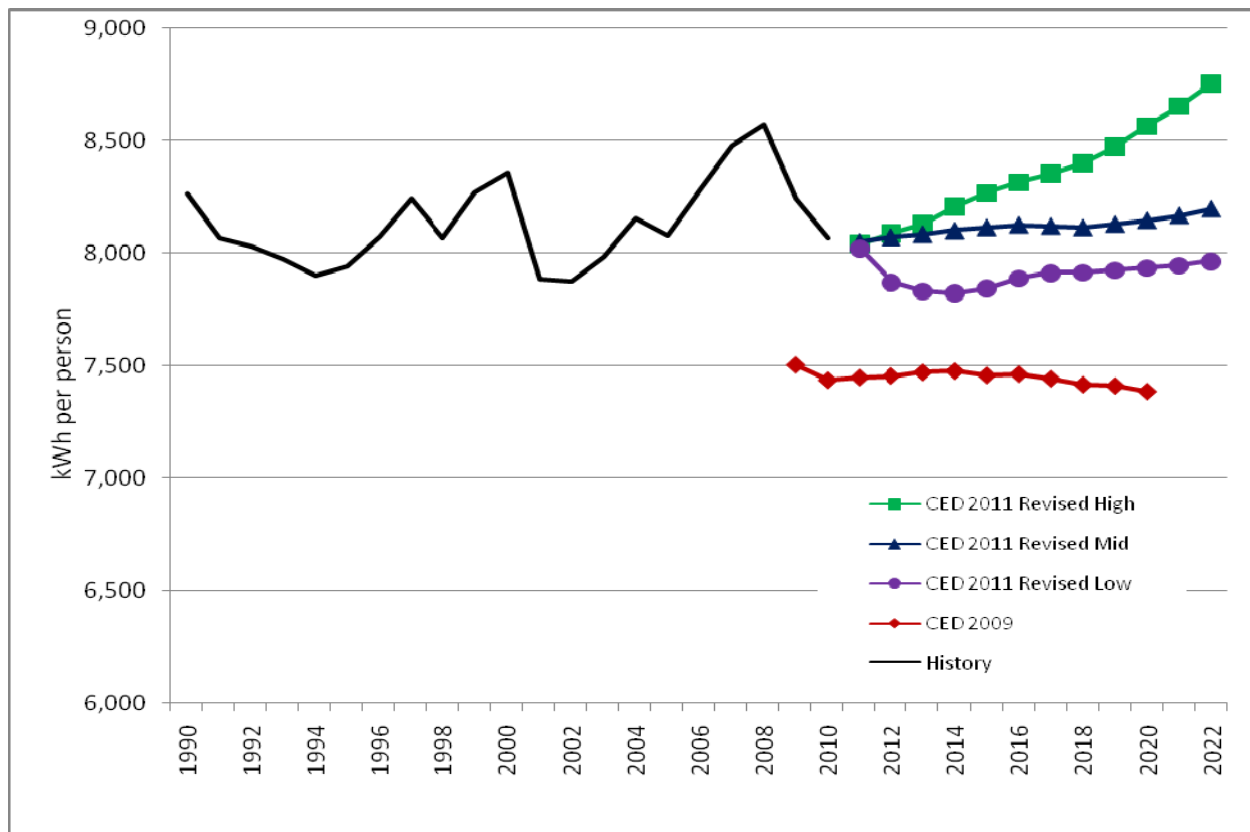
Figure 1-2: PG&E Planning Area Peak



Source: California Energy Commission, 2012

As **Figure 1-3** shows, per capita electricity consumption is higher in the *CED 2011 Revised* mid and high demand scenarios throughout the entire period compared to *CED 2009*. For the low demand scenario, per capita consumption declines in the early period and then increases to the level of the previous forecast by the end of the period. Per capita consumption is higher in recent history compared to *CED 2009* because of inclusion of the 2010 Census estimates of population, lower than the higher California Department of Finance estimates used in *CED 2009*. *CED 2011 Revised* projections remain below levels witnessed in recent history in the mid and low demand cases, although they increase slightly toward the end of the forecast period due to growing electric vehicle use.

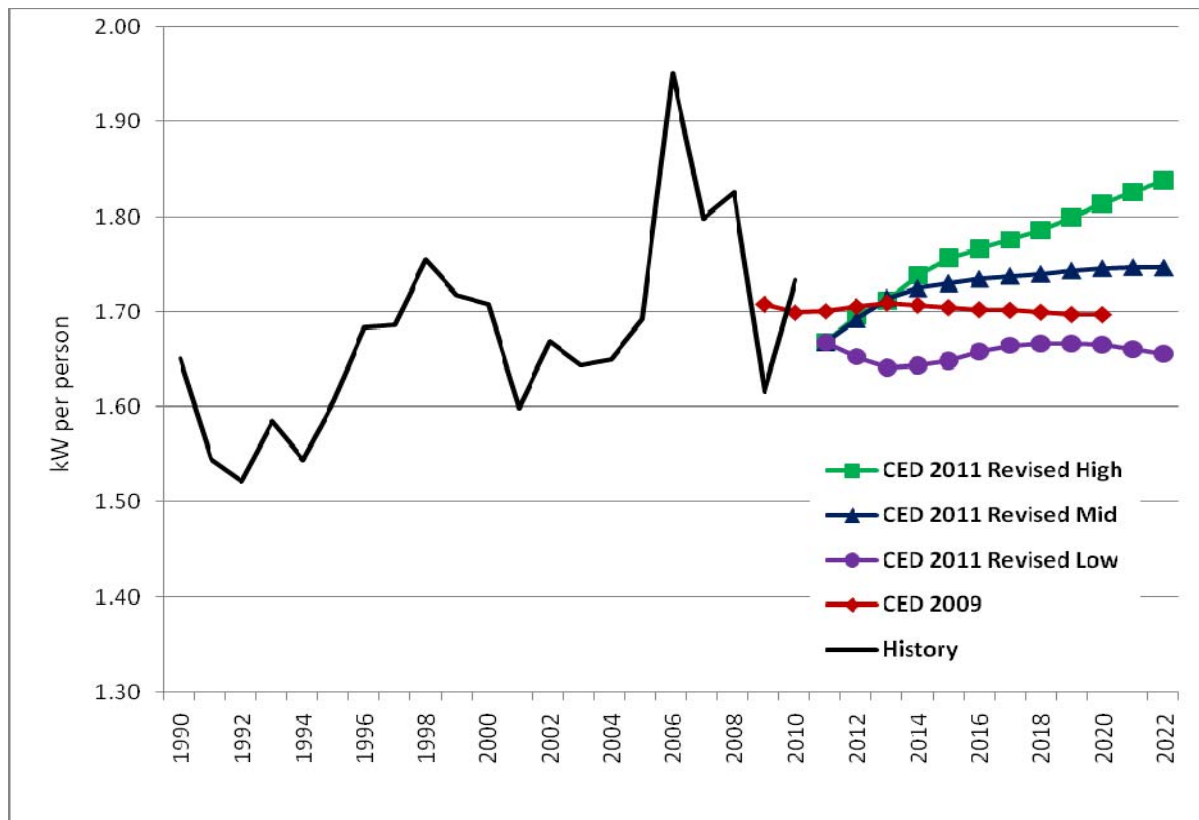
Figure 1-3: PG&E Planning Area Per Capita Electricity Consumption



Source: California Energy Commission, 2012

Figure 1-4 Compares of per capita peak demand. *CED 2011 Revised* per capita peak scenarios follow the same pattern as the per capita consumption scenarios. The per capita peak values are projected to remain in the range of recent historical levels for the mid and low demand scenarios. The high demand scenario approaches the historical maximum toward the end of the forecast period.

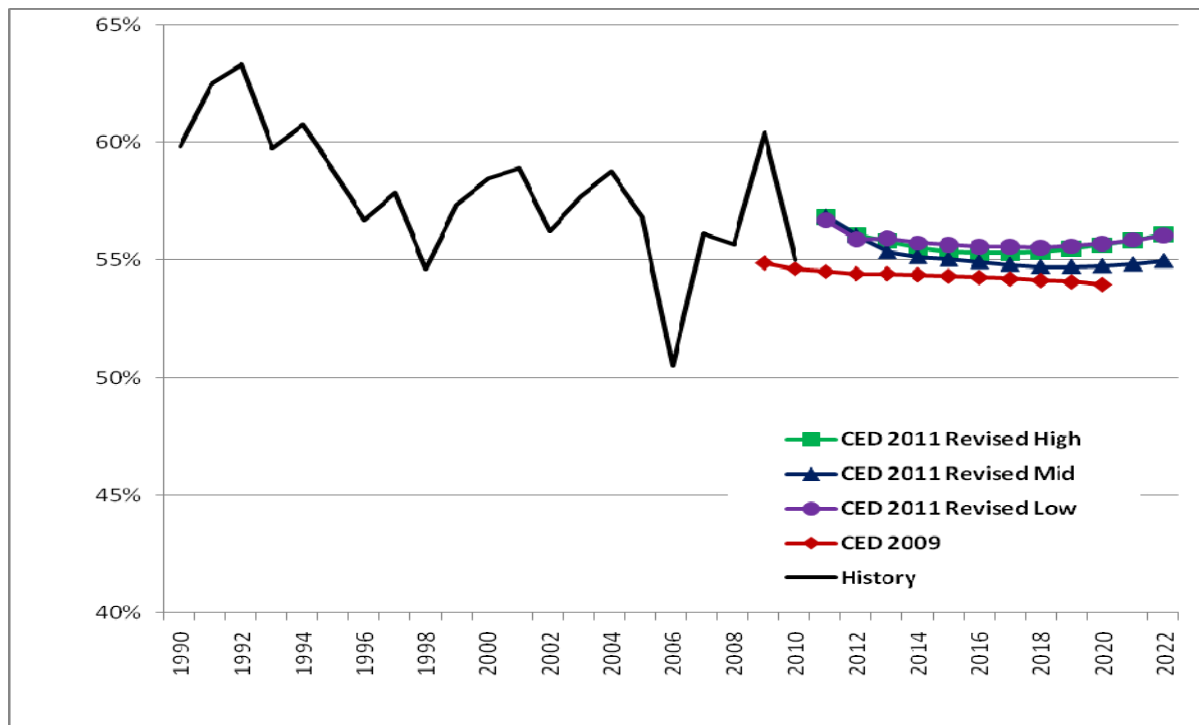
Figure 1-4: PG&E Planning Area per Capita Peak Demand



Source: California Energy Commission, 2012

Figure 1-5 Compares of forecast load factors. The load factor is a measure of the increase in peak demand relative to annual electricity consumption. Lower load factors indicate “a needle peak”; higher load factors indicate a more stable load. Historical data show a long-term downward trend as consumption shifted away from the industrial sector toward residential and commercial use. Further, more population and economic growth in the PG&E planning area has been taking place in hotter inland areas, leading to greater saturation of central air conditioning. In addition, recent years have seen a greater use of air conditioning equipment in the cooler Bay Area on warm days. *CED 2011 Revised* projected load factors are relatively constant over the forecast period and slightly higher than the *CED 2009* forecast.

Figure 1-5: PG&E Planning Area Load Factors



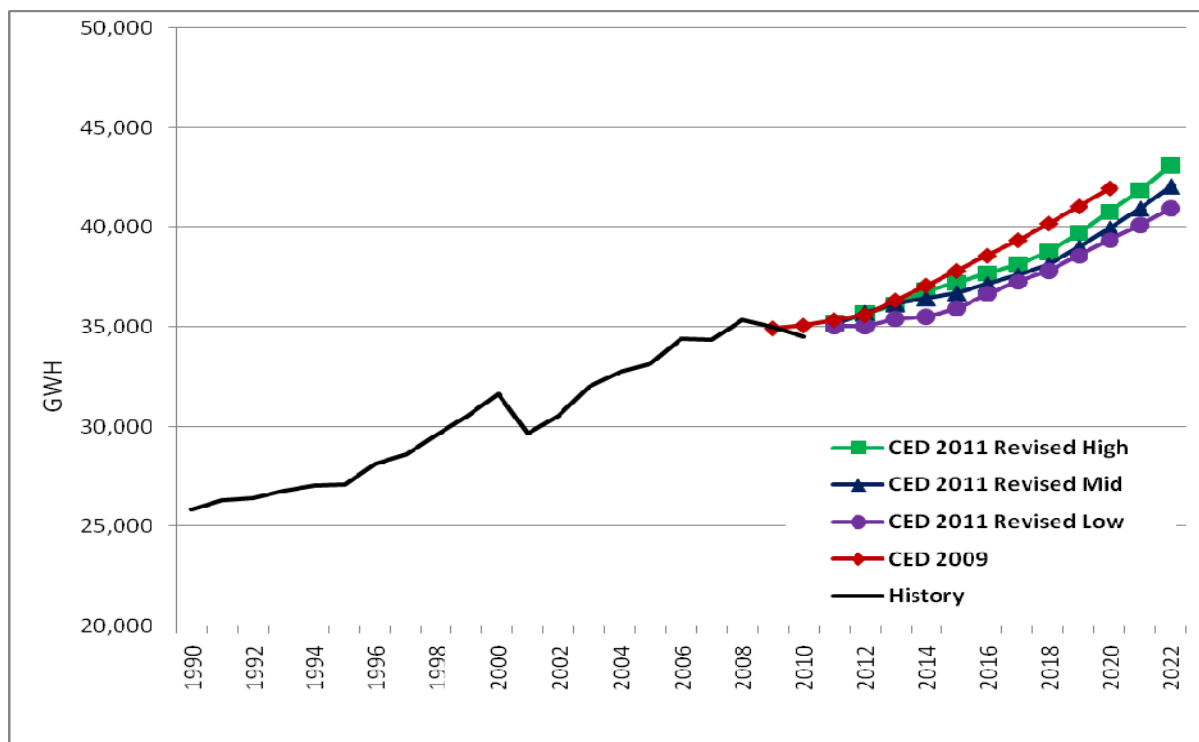
Source: California Energy Commission, 2012

Sector Level Results and Input Assumptions

Residential Sector

Figure 1-6 Compares between *CED 2011 Revised* and *CED 2009* PG&E planning area residential forecasts. All three *CED 2011 Revised* forecast scenarios are lower at the end of the forecast period mainly due to lowered household projections.

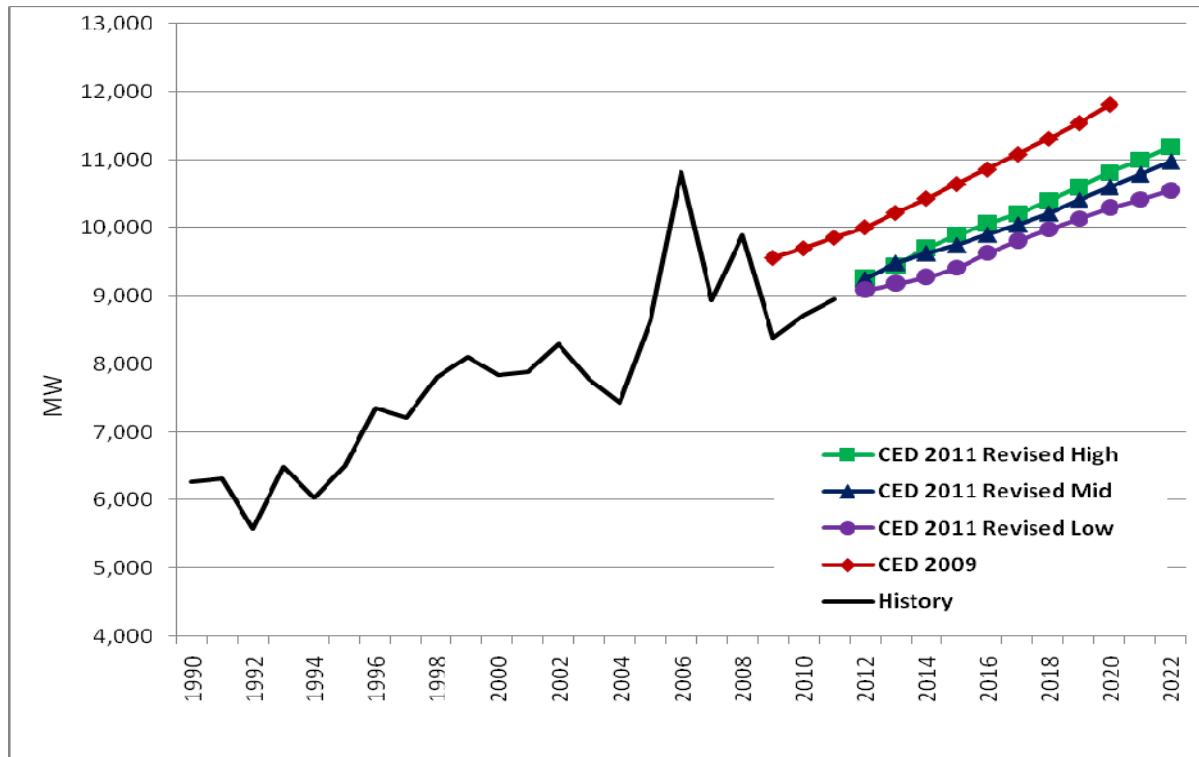
Figure 1-6: PG&E Planning Area Residential Consumption



Source: California Energy Commission, 2012

Figure 1-7 Compares *CED 2011 Revised* and *CED 2009* residential peak demand forecasts. The *CED 2011 Revised* residential peak forecasts are lower than the *CED 2009* forecast due to lower estimated residential historical peaks in 2011. The differences between peak forecasts follow a similar pattern to differences in the consumption forecasts since the peak forecasts are driven primarily by electricity consumption.

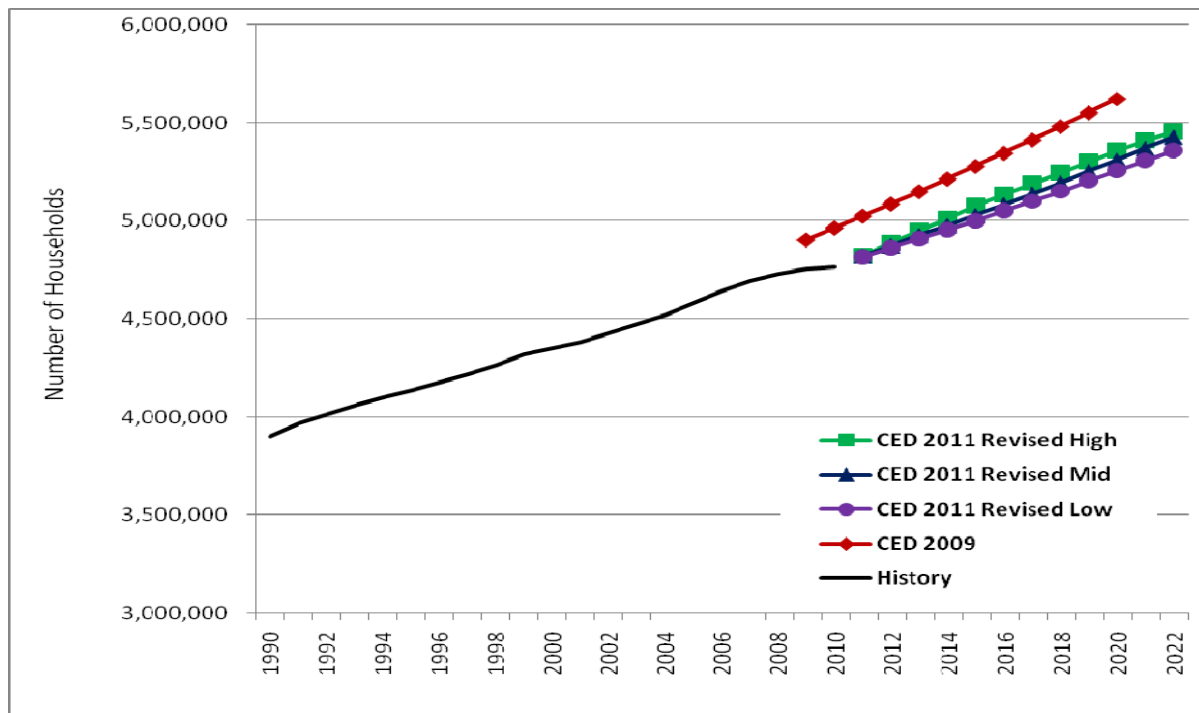
Figure 1-7: PG&E Planning Area Residential Peak



Source: California Energy Commission, 2012

Figure 1-8, Figure 1-9, and Figure 1-10 Compares residential drivers used in *CED 2011 Revised* forecast with those used for *CED 2009*. **Figure 1-8** Compares of total households. The *CED 2011 Revised* forecast mid and low demand scenarios are lower than the previous forecast because of a lower population and household values estimated in the 2010 census. The *CED 2011 Revised* forecast does not include the most recent updated county population forecast from the California Department of Finance, which incorporates information from the 2010 census.

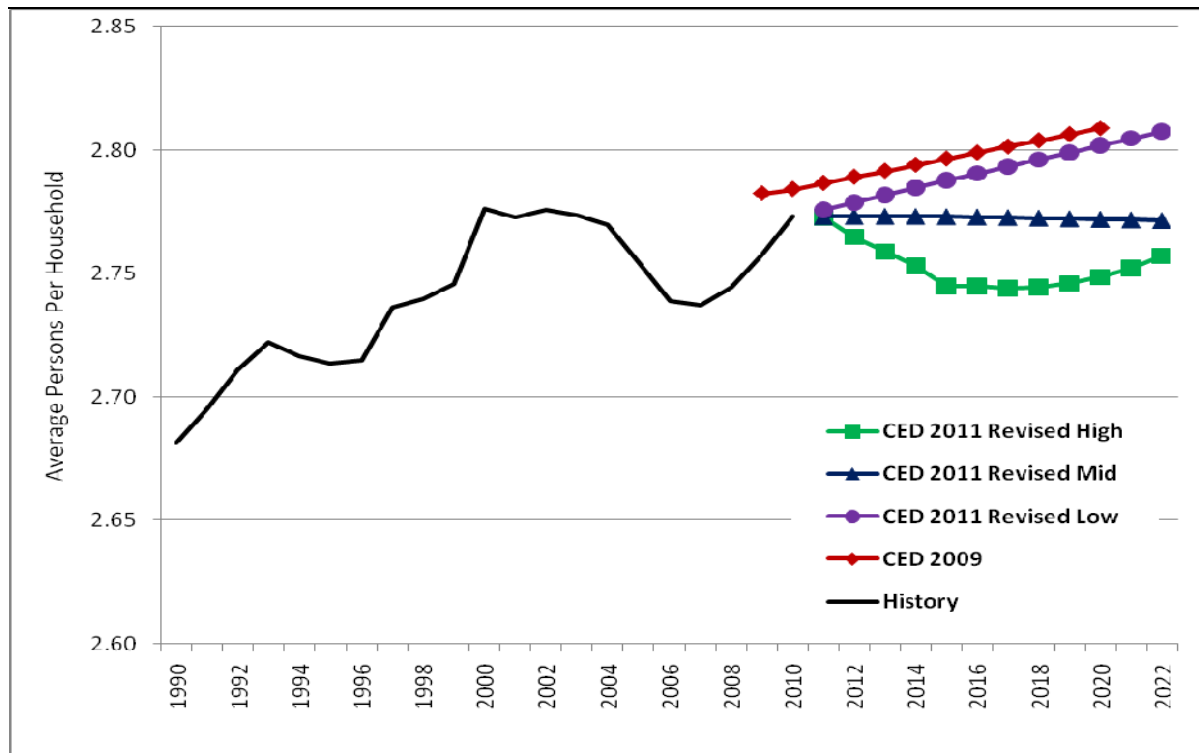
Figure 1-8: PG&E Planning Area Residential Household Projections



Source: California Energy Commission, 2012

The household scenarios are based on persons-per-household changes shown in **Figure 1-9**. The high demand scenario uses lower persons-per-household projection (more households) and the low demand scenario uses higher persons-per-household projection (fewer households). See Volume 1 for a discussion of assumptions driving these projections. The mid demand scenario uses a relatively constant projection for persons per household. All three scenarios use the same household population forecast.

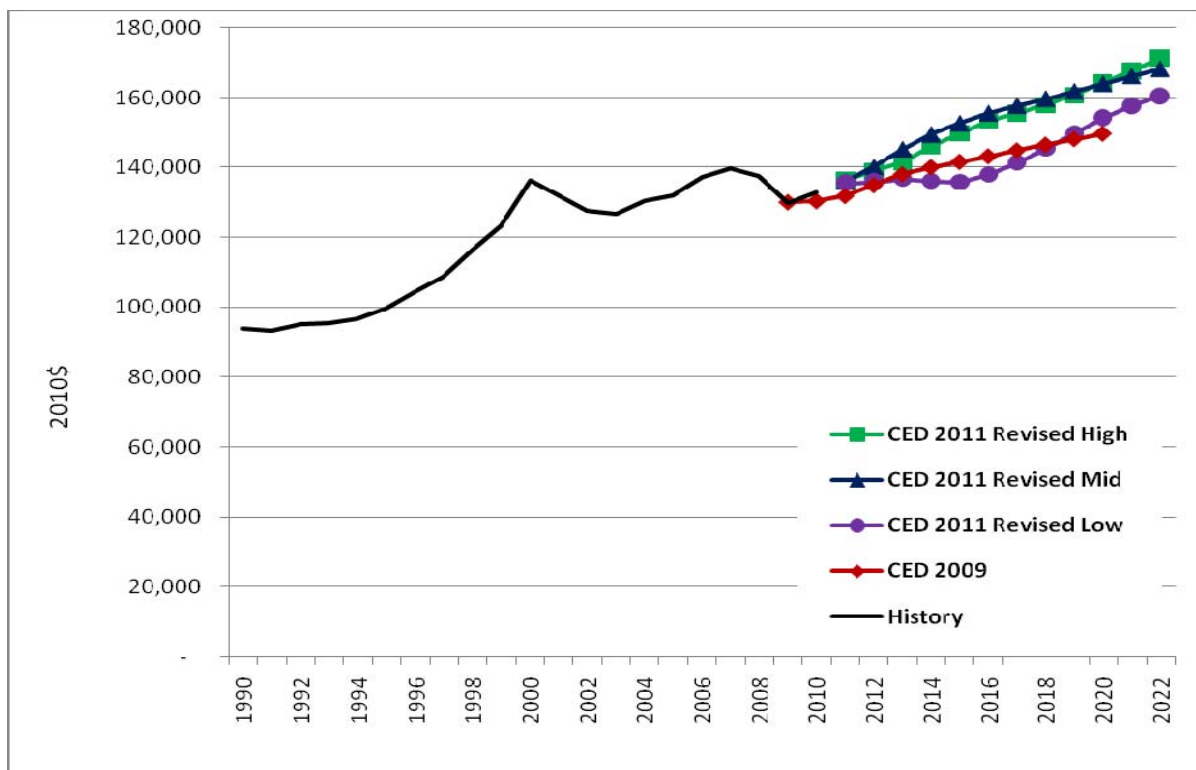
Figure 1-9: PG&E Planning Area Persons per Household Projections



Source: California Energy Commission, 2012

Figure 1-10 Compares of average household income (per capita income multiplied by persons per household) of the two forecasts. In all three scenarios, *CED 2011 Revised* estimates of household income are higher at the end of the forecast period than *CED 2009*. This is caused by higher growth projections for personal income than were used in the previous forecast. The difference between scenarios is a function of the variation in per capita income and persons per household used to define the scenarios.

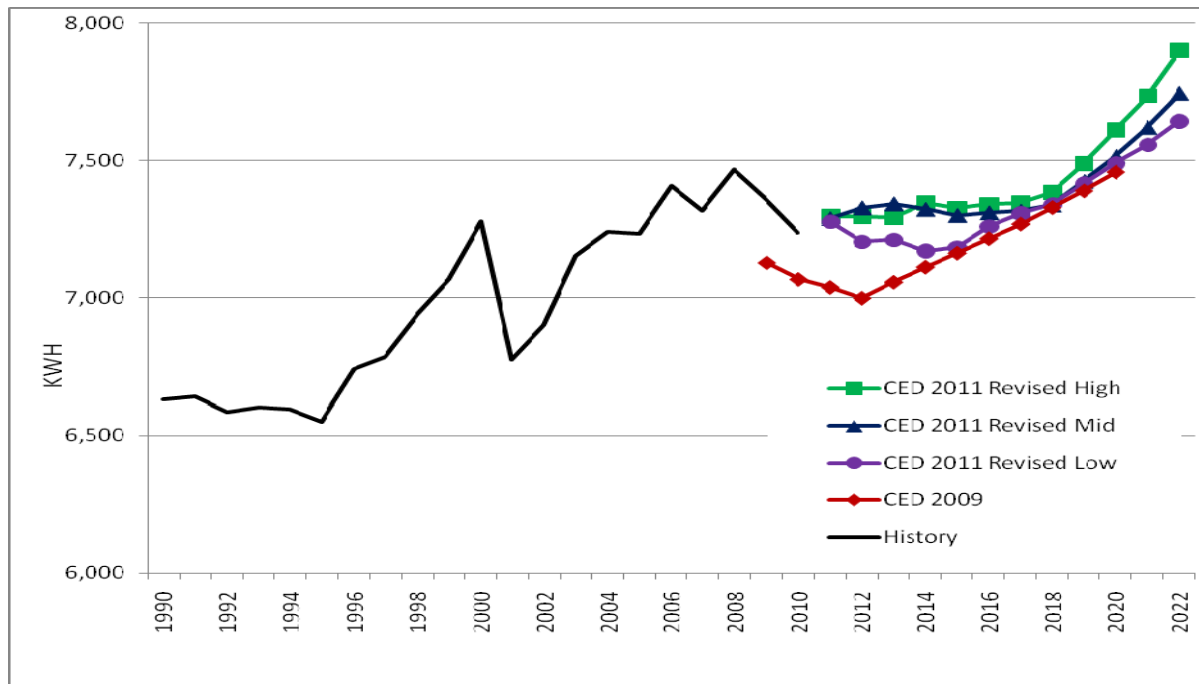
Figure 1-10: PG&E Planning Area Average Household Income Projections



Source: California Energy Commission, 2012

Figure 1-11 gives a comparison of annual electricity consumption per household. *CED 2011 Revised* forecasts are similar to *CED 2009*, though higher throughout the forecast period. This is caused by differences in the underlying economic and demographic assumptions. Most of the growth in use per household after 2015 is caused by increased numbers of electric vehicles in the residential sector. In the mid case, this adds roughly 280 kilowatt hours (kWh) per household to the residential total by 2022 in the PG&E planning area. Without the inclusion of electric vehicle charging, residential use would be relatively constant over the forecast period.

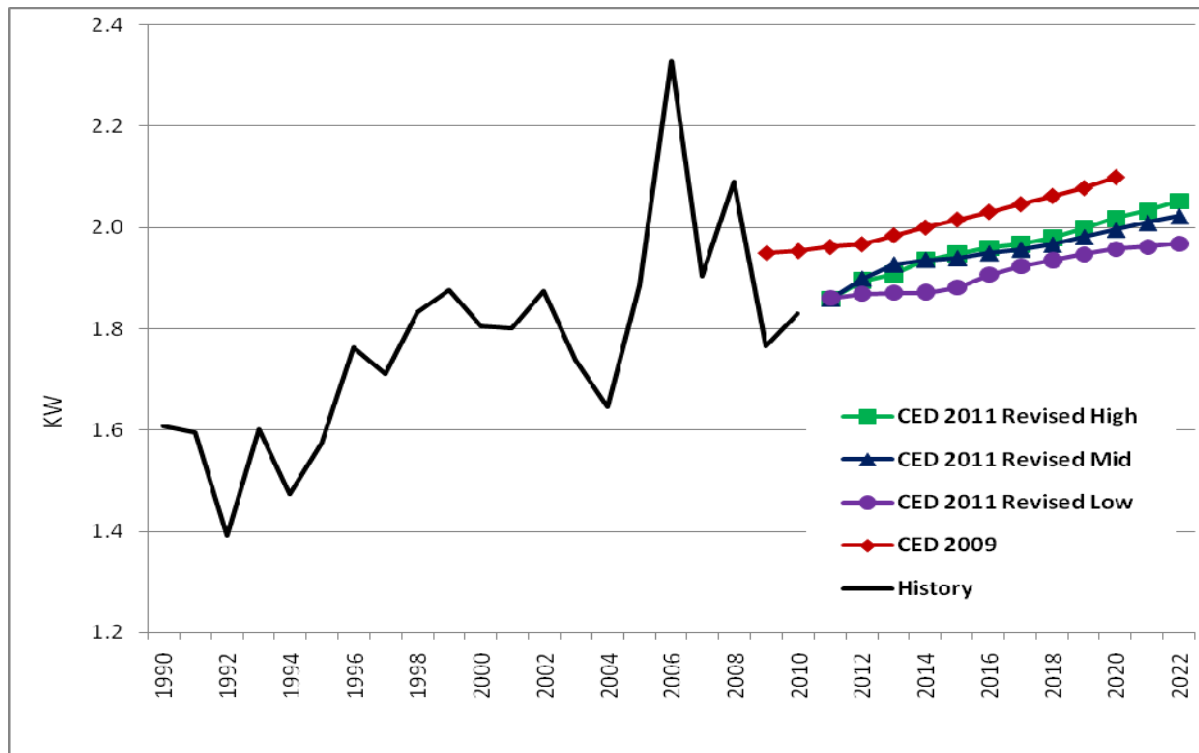
Figure 1-11: PG&E Planning Area Consumption per Household



Source: California Energy Commission, 2012

Figure 1-12 Compares of peak use per household. The *CED 2011 Revised* forecast of peak use per household grows modestly over the forecast period in a pattern similar to but slightly lower than the *CED 2009* forecast. The decrease in level is caused by lower recent historical estimates of residential peak. When compared to consumption per household, the forecast of peak per household shows relatively little impact from electric vehicle adoption. This is due to the assumption that personal electric vehicles will be charged primarily during off-peak hours.

Figure 1-12: PG&E Planning Area Peak Use per Household

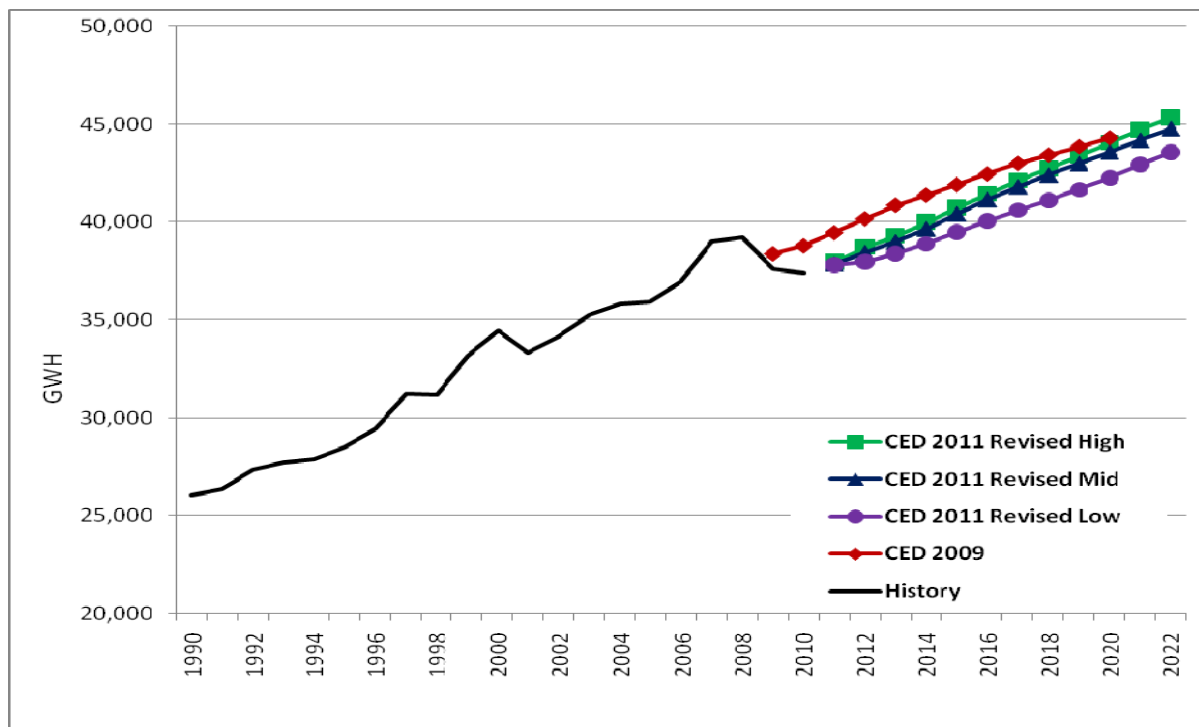


Source: California Energy Commission, 2012

Commercial Sector

Figure 1-13 Compares the commercial sector forecasts. The *CED 2011 Revised* demand scenarios are lower throughout the entire forecast period than *CED 2009*. The differences are primarily caused by a lower starting point because of lower estimates of recent historical commercial floor space. The growth rate of commercial consumption is slightly higher than in *CED 2009* because of higher projections for floor space growth.

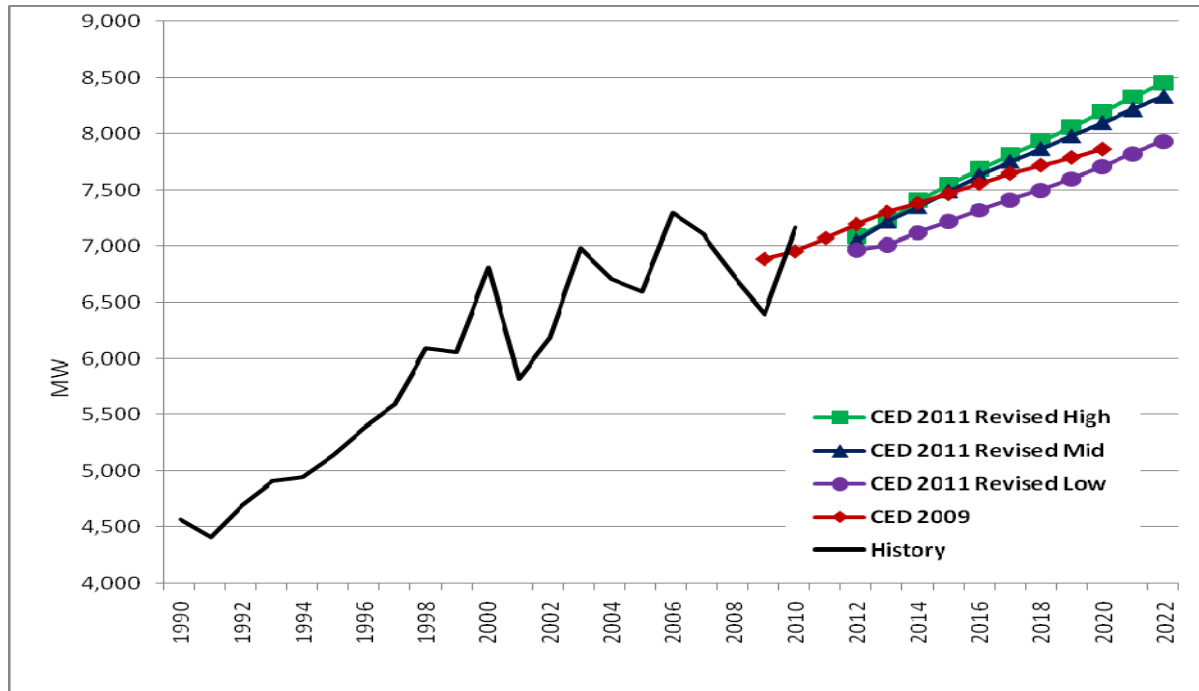
Figure 1-13: PG&E Planning Area Commercial Consumption



Source: California Energy Commission, 2012

Figure 1-14 Compares of the commercial peak demand forecasts. Growth in both forecasts is driven by the underlying electricity consumption forecast, which exhibits the same pattern. The *CED 2011 Revised* forecast mid and high demand scenarios produce a higher peak forecast because of higher growth in floor space.

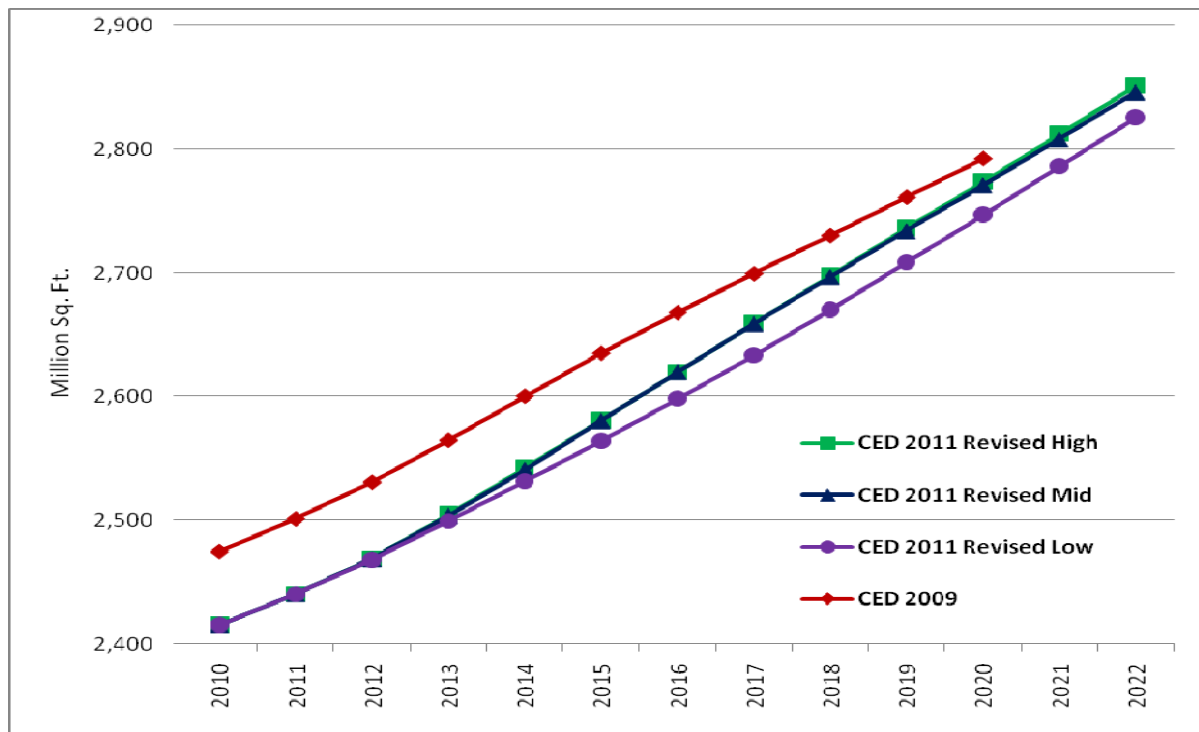
Figure 1-14: PG&E Planning Area Commercial Sector Peak



Source: California Energy Commission, 2012

In staff's commercial building sector forecasting model, floor space by building type, such as retail, offices, and schools, is the key driver. **Figure 1-15** Compares of total commercial floor space projections. *CED 2011 Revised* floor space projections are somewhat lower over the forecast period than those used in the previous forecast because of a lower starting point. However, the growth rate in each of the three *CED 2011 Revised* scenarios is higher than in *CED 2009*.

Figure 1-15: PG&E Planning Area Commercial Floor Space

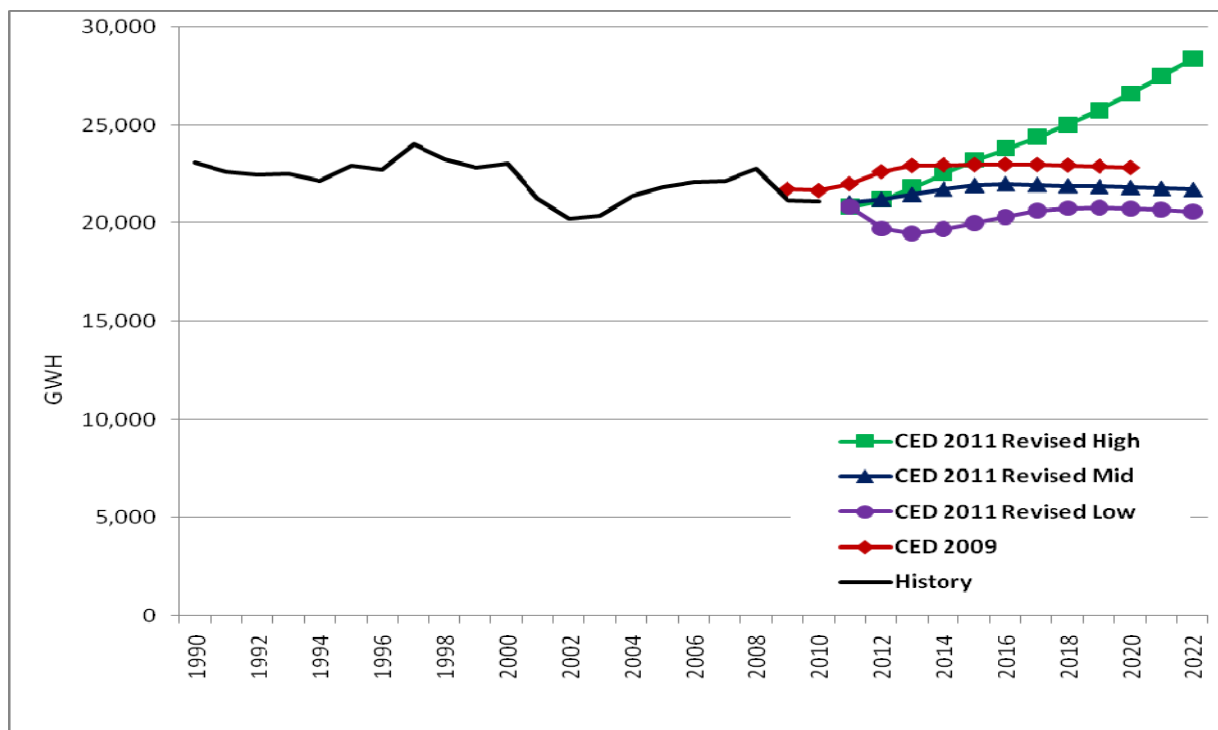


Source: California Energy Commission, 2012

Industrial Sector

Figure 1-16 compares the PG&E planning area industrial sector electricity consumption forecasts. *CED 2011 Revised* industrial consumption forecasts are all lower than the *CED 2009* forecast in the short term. However, the projected growth in the *CED 2011 Revised* forecast high demand case is higher in the longer term than was projected in the *CED 2009* forecast due to more optimistic economic projections. The mid demand scenario follows the same growth pattern as the *CED 2009* forecast but starts from a lower historical starting point. The differences in demand scenarios are mainly driven by differences in economic output projections.

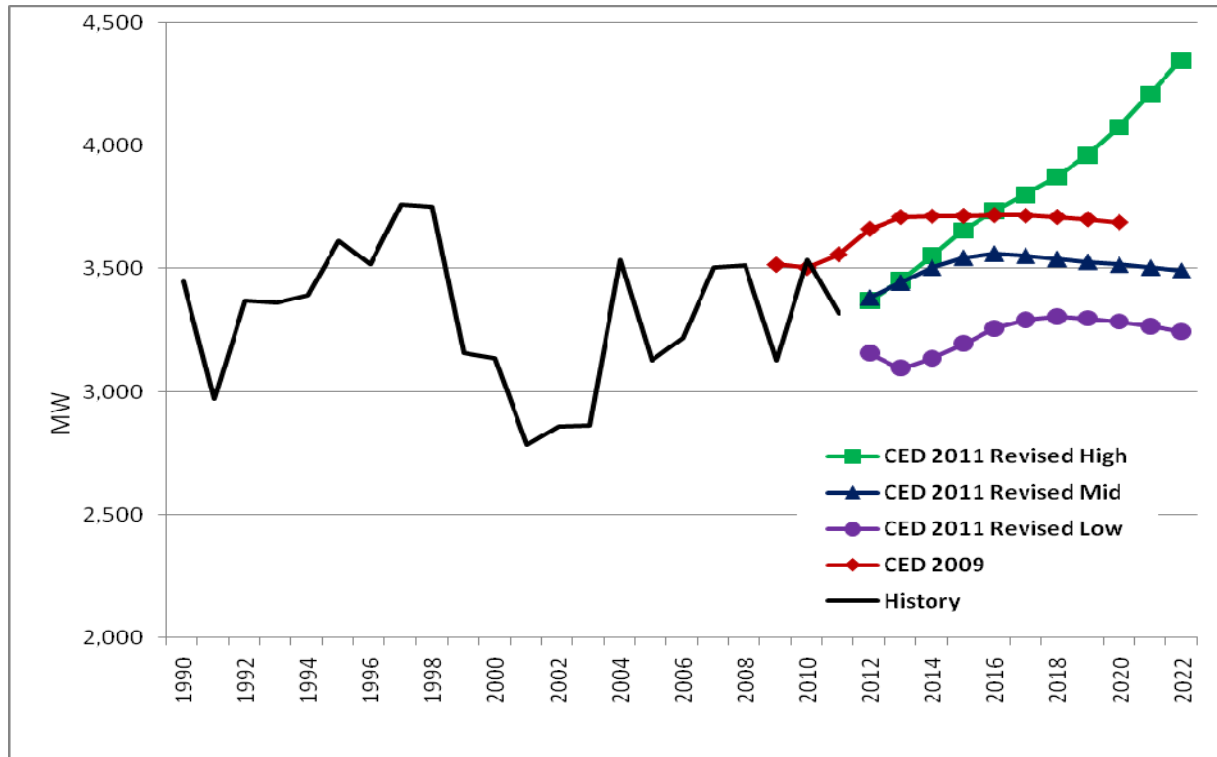
Figure 1-16: PG&E Planning Area Industrial Consumption



Source: California Energy Commission, 2012

Figure 1-17 Compares the industrial sector peak forecasts. The *CED 2011 Revised* industrial peak forecasts follow the same pattern as the consumption forecasts.

Figure 1-17: PG&E Planning Area Industrial Sector Peak

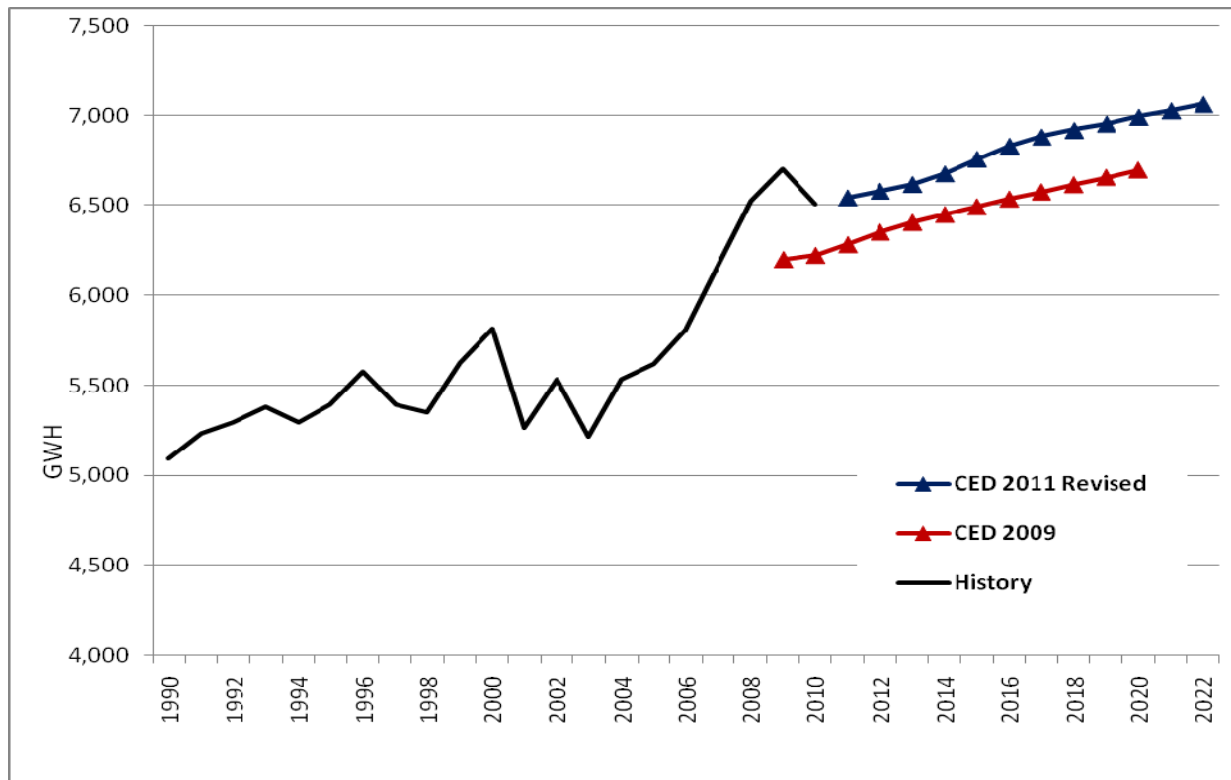


Source: California Energy Commission, 2012

Other Sectors

Figure 1-18 Compares the electricity consumption forecasts for the transportation, communications, and utilities (TCU) sector, which includes street lighting. In this case, a single scenario was run.¹ *CED 2011 Revised* is higher than *CED 2009*, given the higher starting point, a result of assigning previously unclassified consumption to this sector based on recent QFER filings.

Figure 1-18: PG&E Planning Area Transportation, Communication, Utilities, and Street Lighting Sector Electricity Forecasts

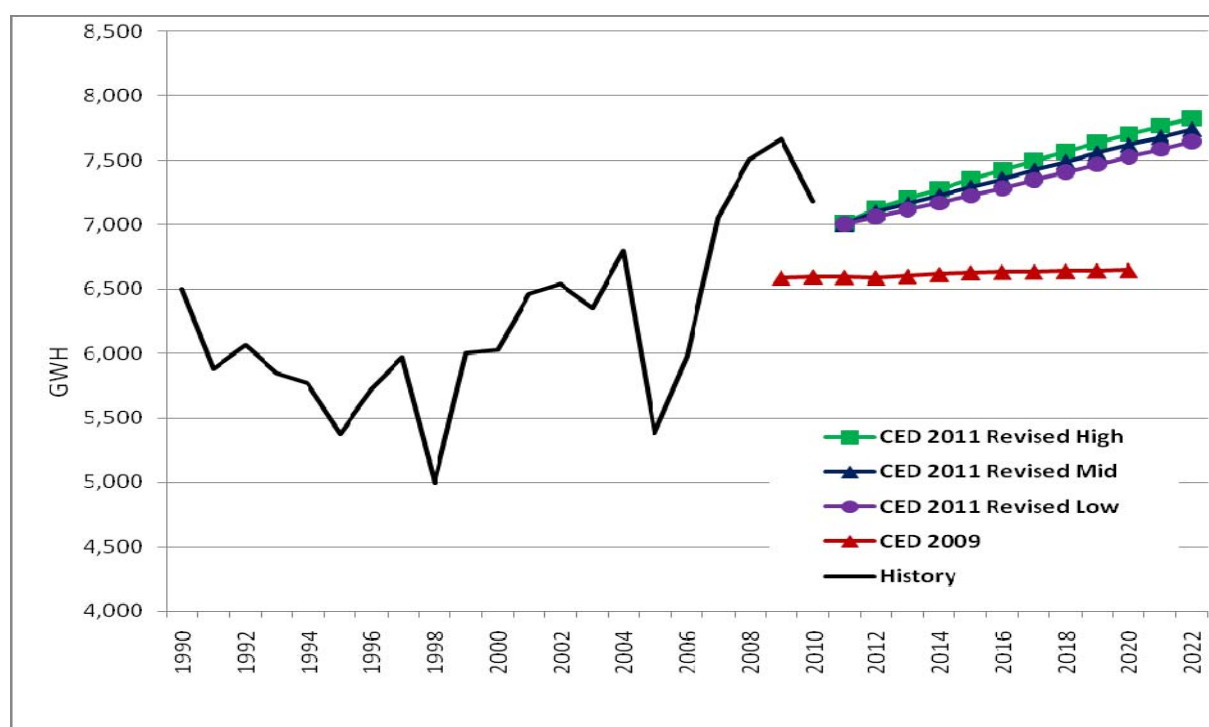


Source: California Energy Commission, 2012

¹ Growth in TCU consumption depends mainly on population, for which there is only one scenario.

Figure 1-19 Compares the electricity consumption forecasts for the agriculture and water pumping sectors. The *CED 2011 Revised* agriculture and water pumping forecasts are higher than *CED 2009* because of a higher starting point. All three demand scenarios are projected to grow slightly over time rather than remain flat as projected in the *CED 2009* forecast. This caused a projected increase in ground-water pumping. The small difference in consumption between the *CED 2011 Revised* demand scenarios is a result of different household projections for urban water pumping and agricultural pumping rates in the PG&E planning area.

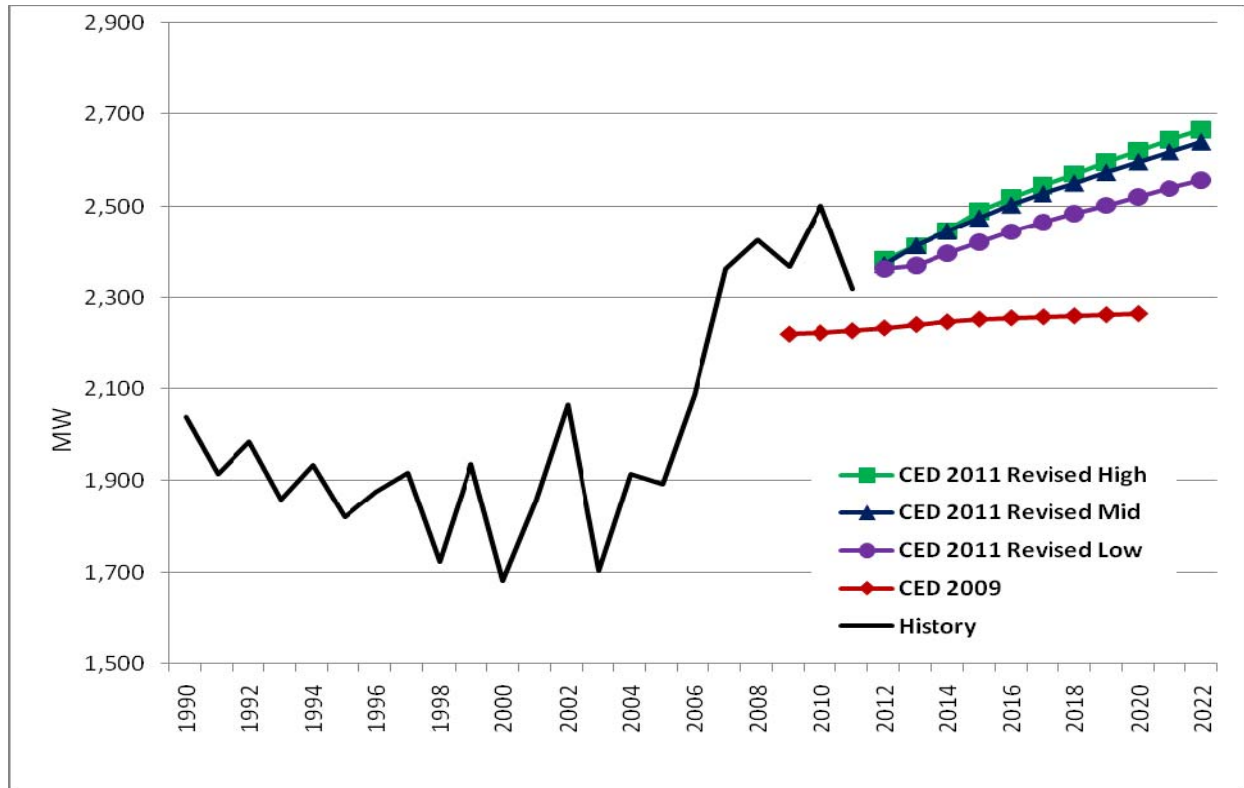
Figure 1-19: PG&E Planning Area Agriculture and Water Pumping Sector Electricity Forecasts



Source: California Energy Commission, 2012

Figure 1-20 Compares projected combined peak for these sectors. *CED 2011 Revised* is higher over the entire forecast period in all three scenarios compared to *CED 2009* because of a higher starting point. *CED 2011 Revised* growth rates are also higher than that of the *CED 2009* forecast because of increased water pumping loads.

Figure 1-20: PG&E Planning Area Other Sector Peak

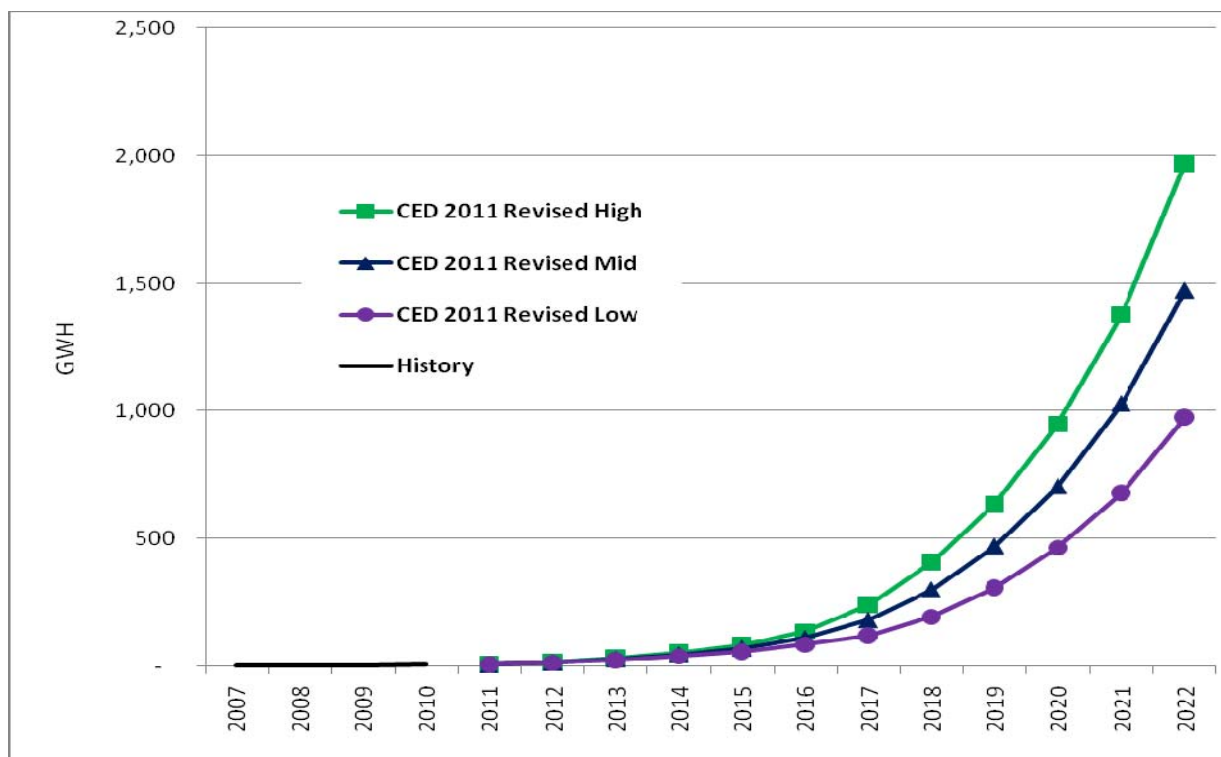


Source: California Energy Commission, 2012

Electric Vehicles

The consumption of electric vehicles in 2010 was 7 GWh for the PG&E planning area and is expected to rise to more than 100 GWh by 2016. By the end of the forecast period, PG&E planning area use by electric vehicles is projected to reach nearly 1,000 GWh in the low demand scenario and nearly 2,000 GWh in the high demand scenario. Staff assumed most recharging would occur during off-peak hours, so peak impacts are projected to be relatively small. **Figure 1-21** presents the PG&E planning area electric vehicle consumption forecast for each of the demand scenarios.

Figure 1-21: PG&E Electricity Consumption of Electric Vehicles



Source: California Energy Commission, 2012

Self-Generation

The peak demand forecast is reduced by self-generation, including the effects of SGIP, CSI, and other programs, as discussed in Volume 1. The effects of these programs are forecast based on recent trends in installations and a residential predictive model. **Table 1-2** shows the forecast of peak impacts from photovoltaic (PV) and non-PV self-generation. Only residential PV impacts varied in the demand scenarios, based on differences in households and energy rates. Staff projects between 584 and 706 MW of peak reduction from PV systems by 2022. Peak reductions are based on installed PV system capacities ranging from 1,173 MW by 2022 in the high demand case to 1,400 MW by 2022 in the low demand case.

Table 1-2: PG&E Planning Area Self Generation Peak Impacts (MW)

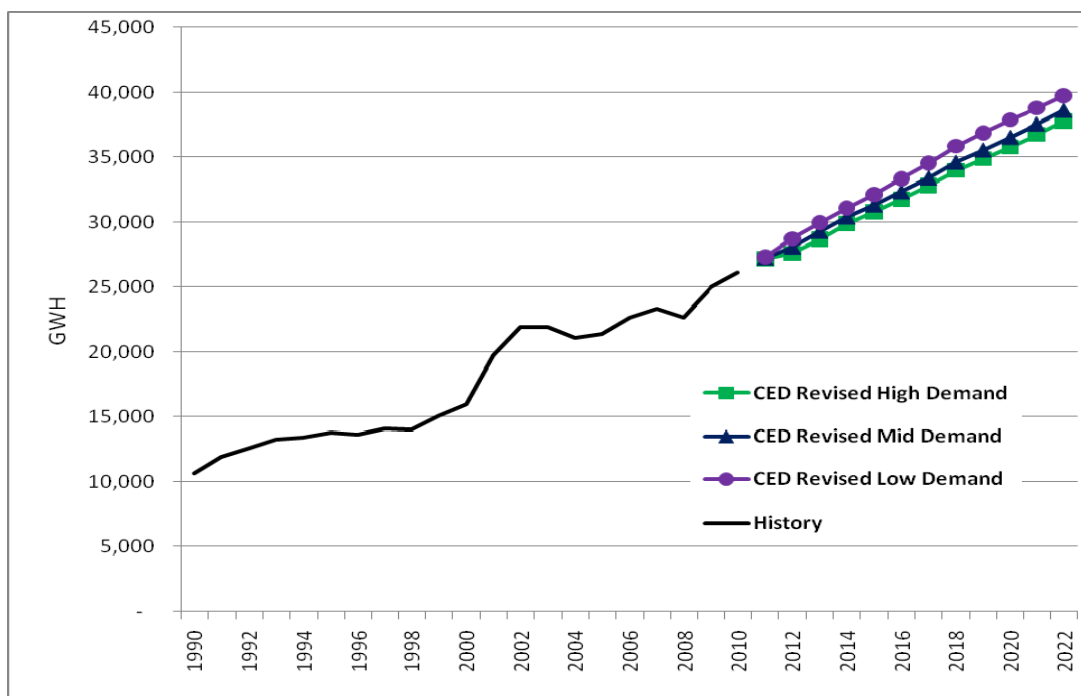
	1990	2000	2010	2015	2020	2022
Non-Photovoltaic Self-Generation	597.68	671.23	819.81	846.13	855.63	868.19
Photovoltaic, Low Demand	0.00	0.43	212.76	447.21	583.53	706.62
Photovoltaic, Mid Demand	0.00	0.43	212.76	426.05	527.44	626.15
Photovoltaic, High Demand	0.00	0.43	212.76	416.20	502.05	584.45
Total Self-Generation, Low Demand	597.68	671.67	1032.57	1293.34	1439.17	1574.81
Total Self-Generation, Mid Demand	597.68	671.67	1032.57	1272.19	1383.08	1494.34
Total Self-Generation, High Demand	597.68	671.67	1032.57	1262.33	1357.69	1452.64

Source: California Energy Commission, 2012

Conservation/Efficiency Impacts

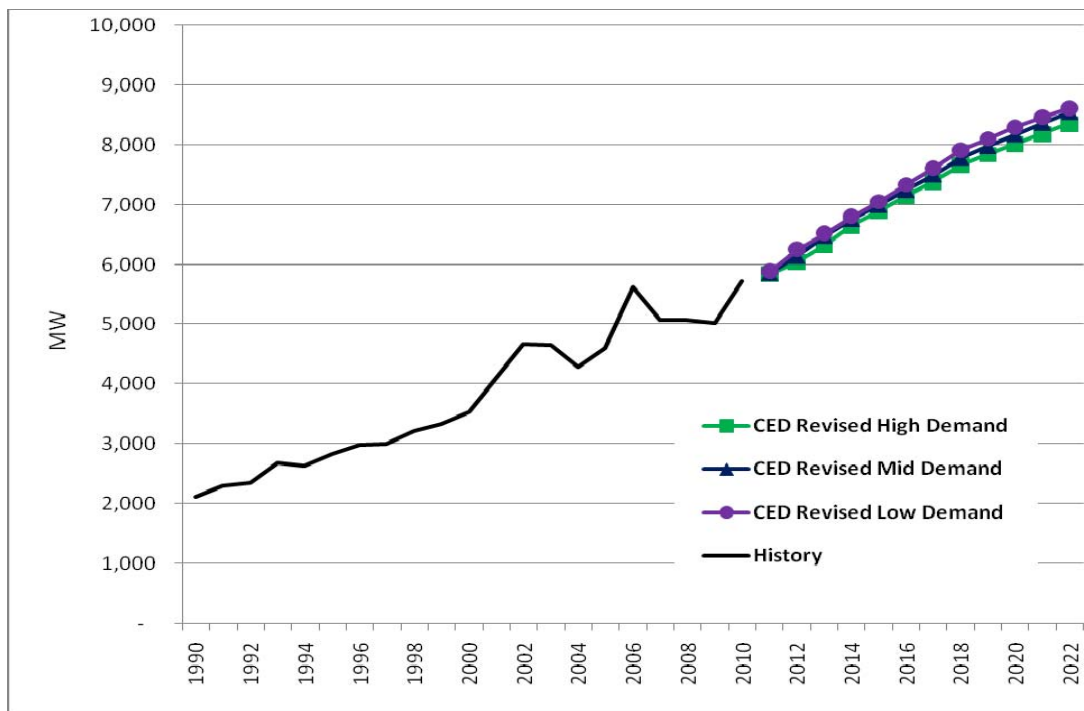
Staff has spent a great deal of time refining methods to account for energy efficiency and conservation impacts while preparing this forecast. **Figure 1-22** and **Figure 1-23** on the next page show committed electricity consumption and peak efficiency savings estimates from all sources, including building and appliance standards; utility programs implemented before 2013; and price and other effects. Projected savings impacts are highest in the low demand scenario, since price and program effects are inversely related to the demand outcome. Peak results show less difference among the scenarios, since residential consumption savings totals are very similar and the residential sector has a disproportionately large effect on peak demand.

Figure 1-22: PG&E Planning Area Electricity Consumption Savings Estimates



Source: California Energy Commission, 2012

Figure 1-23: PG&E Planning Area Electricity Peak Savings Estimates



Source: California Energy Commission, 2012

Table 1-3 presents estimated savings for building and appliance standards in the mid demand case for selected years. Total standards impacts are higher in the high demand case by 1.5-2.0 percent because of higher home and commercial floor space construction and 1.5-2.0 percent lower in the low demand case. The standards savings estimates include the 2010 revision to Title 24 building standards as well as AB 1109 (Huffman, Chapter 534, Statutes of 2007) lighting savings and television standard savings. Savings are measured against a baseline before 1975, so they incorporate more than 30 years of impacts. Volume 1 provides more detail on staff work related to energy efficiency and conservation.

Table 1-3: PG&E Planning Area Standards Savings Estimates

Electricity Consumption Savings (GWh)							
	Residential			Commercial			
	Building Standards	Appliance Standards	Total	Building Standards	Appliance Standards	Total	Total Standards
1990	1,101	813	1,914	421	235	655	2,569
2000	2,633	2,902	5,536	958	703	1,662	7,197
2010	2,953	6,219	9,172	1,730	1,182	2,912	12,084
2015	3,289	8,712	12,001	2,407	1,663	4,070	16,071
2020	3,689	10,762	14,451	3,212	2,385	5,597	20,049
2022	3,825	11,190	15,015	3,527	2,508	6,035	21,050
Electricity Peak Demand Savings (MW)							
	Residential			Commercial			
	Building Standards	Appliance Standards	Total	Building Standards	Appliance Standards	Total	Total Standards
1990	267	197	464	74	41	115	579
2000	653	720	1,373	189	139	328	1,701
2010	747	1,573	2,319	332	227	559	2,878
2015	874	2,315	3,189	446	308	754	3,943
2020	980	2,859	3,839	597	443	1,040	4,879
2022	999	2,923	3,921	656	467	1,123	5,045

Source: California Energy Commission, 2012

CHAPTER 2: Southern California Edison Planning Area

The Southern California Edison (SCE) planning area includes

- SCE bundled retail customers.
- Customers served by energy service providers (ESPs) using the SCE distribution system to deliver electricity to end users.
- Customers of the various Southern California municipal and irrigation district utilities with the exception of Imperial Irrigation District and the cities of Los Angeles, Pasadena, Glendale, and Burbank. Also excluded from the SCE planning area are San Diego County and the southern portion of Orange County, served by SDG&E.

This chapter is organized as follows. First, forecasted consumption and peak loads for the SCE planning area are discussed; both total and per capita values are presented. The *CED 2011 Revised* values are compared to the adopted *CED 2009* forecast, with differences between the two forecasts explained. The forecasted load factor, jointly determined by the consumption and peak load estimates, is also discussed. Second, the chapter presents sector consumption and peak load forecasts. The residential, commercial, industrial, and “other” sector forecasts are compared to those in *CED 2009*, and differences between the two are discussed. Third, the chapter discusses the forecasts of electric vehicles, self-generation, and the impacts of conservation and efficiency programs.

Forecast Results

Table 2-1 compares *CED 2011 Revised* forecast scenarios of electricity consumption and peak demand for selected years with the *CED 2009* forecast. *CED 2011 Revised* mid demand electricity consumption is 4 percent lower than *CED 2009* in 2020. This is primarily a result of the recent economic downturn, causing 2010 recorded consumption to be 2.5 percent lower than was projected in *CED 2009*. The long-term growth rate of the mid demand scenario is only slightly lower than was projected in the *CED 2009* forecast. The *CED 2011 Revised* high demand level is similar to *CED 2009* in 2020 while the low demand scenario is 7 percent lower.

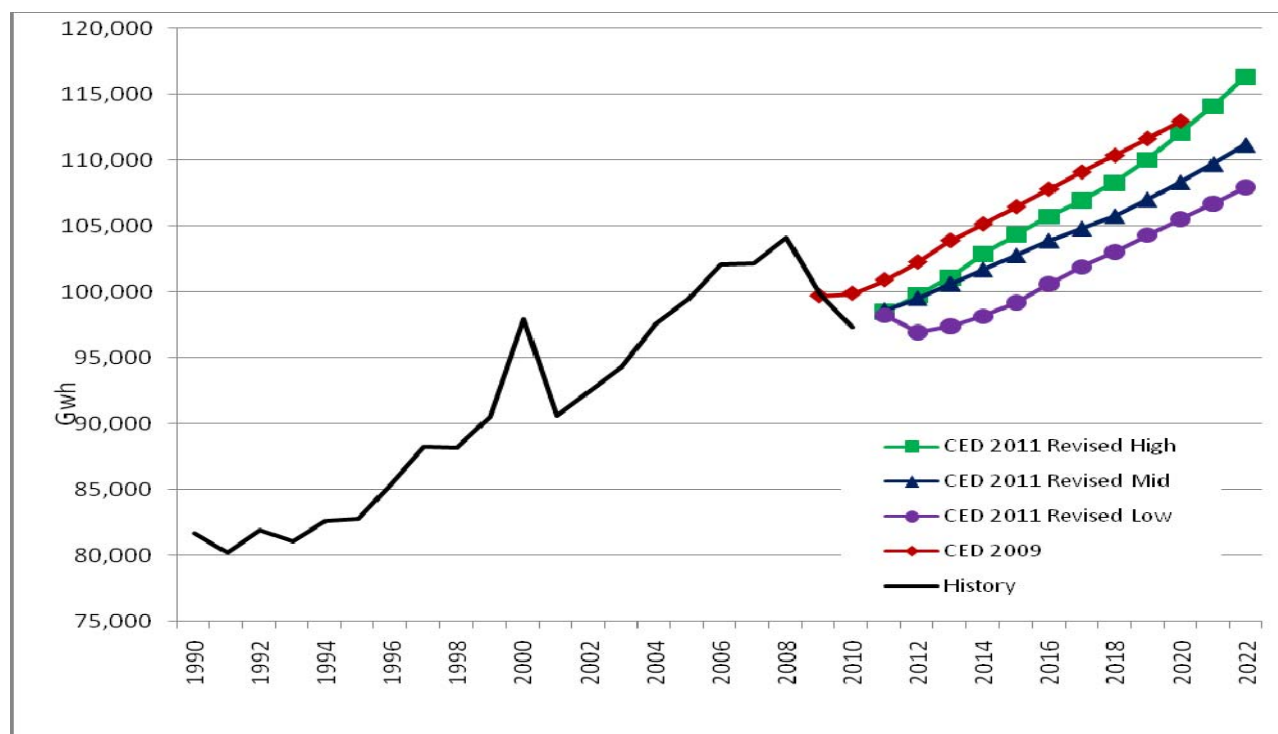
Table 2-1: SCE Planning Area Forecast Comparison

Consumption (GWh)				
	<i>CED 2009 (Dec. 2009)</i>	CED 2011 Revised-High	CED 2011 Revised-Mid	CED 2011 Revised-Low
1990	82,069	81,671	81,671	81,671
2000	99,148	97,979	97,979	97,979
2010	99,875	97,290	97,290	97,290
2011	100,907	98,492	98,602	98,211
2015	106,460	104,369	102,770	99,177
2020	112,964	112,103	108,354	105,514
2022	--	116,366	111,212	107,954
Average Annual Growth Rates				
1990 - 2000	1.91%	1.84%	1.84%	1.84%
2000 - 2010	0.07%	-0.07%	-0.07%	-0.07%
2011 - 2015	1.35%	1.46%	1.04%	0.25%
2011 - 2020	1.26%	1.45%	1.05%	0.80%
2011 - 2022	--	1.53%	1.10%	0.86%
Peak (MW)				
	<i>CED 2009 (Dec. 2009)</i>	CED 2011 Revised-High	CED 2011 Revised-Mid	CED 2011 Revised-Low
1990	17,647	17,647	17,647	17,647
2000	19,506	19,506	19,506	19,506
2011	23,181	21,925	21,925	21,925
2011*	23,181	21,781	21,781	21,781
2015	24,543	23,960	23,525	22,404
2020	26,267	25,981	25,047	23,840
2022	--	26,830	25,578	24,175
Average Annual Growth Rates				
1990 - 2000	1.01%	1.01%	1.01%	1.01%
2000 - 2011	1.58%	1.07%	1.07%	1.07%
2011* - 2015	1.44%	2.41%	1.94%	0.71%
2011* - 2020	1.40%	1.98%	1.56%	1.01%
2011* - 2022	--	1.91%	1.47%	0.95%
Historical values are shaded.				
*Weather normalized: <i>CED 2011 Revised</i> uses a weather-normalized peak value derived from the actual 2011 peak for calculating growth rates during the forecast period.				

Source: California Energy Commission, 2012

As shown in **Figure 2-1**, *CED 2011 Revised* electricity consumption forecasts are lower at the beginning of the forecast period than *CED 2009* because of the recent economic downturn, causing a greater than anticipated drop in 2010 consumption. Forecast growth in the low and mid demand cases is less than *CED 2009*, while the high demand case grows at a faster rate. The low demand case continues to decline thru 2012 before increasing at a similar rate to the mid demand case.

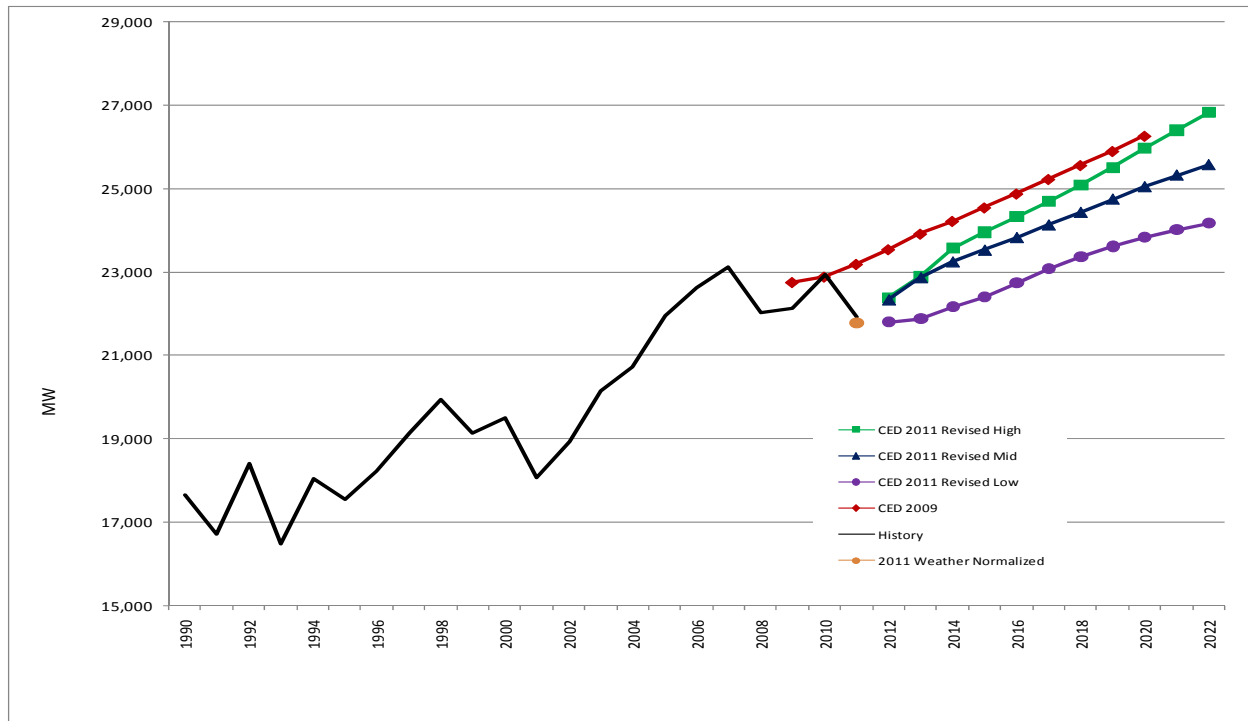
Figure 2-1: SCE Planning Area Electricity Forecast



Source: California Energy Commission, 2012

The *CED 2011 Revised* SCE planning area peak demand forecasts, shown in **Figure 2-2**, are lower than *CED 2009*, consistent with the differences seen in the consumption forecasts. The *CED 2011 Revised* high demand scenario is only slightly below *CED 2009* by 2020. The 2011 SCE planning area weather-normalized peak was relatively close to the actual 2011 planning area peak (noted in **Figure 2-2**), so 2011-2012 growth is similar to that seen in the energy consumption forecasts.

Figure 2-2: SCE Planning Area Peak

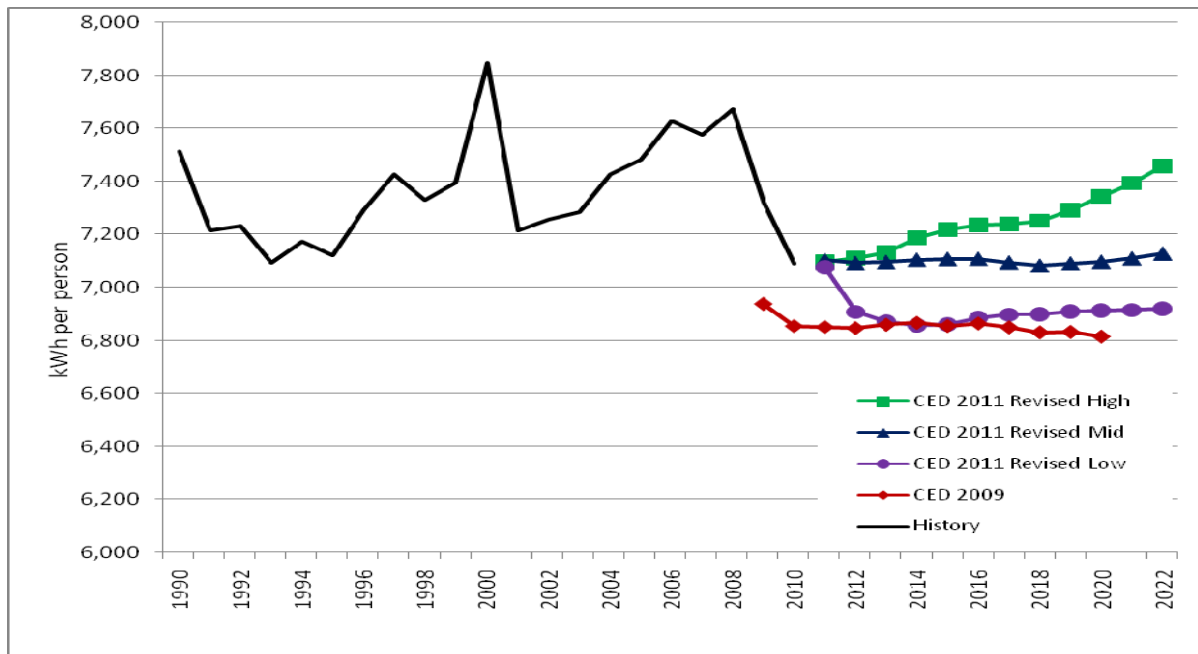


Source: California Energy Commission, 2012

As **Figure 2-3** shows, per capita electricity consumption is higher in the *CED 2011 Revised* mid and high demand scenarios throughout the entire period compared to *CED 2009*. For the low demand scenario, per capita consumption declines in the early period and then increases to the level of the previous forecast by the end of the period. Per capita consumption is higher in recent history compared to *CED 2009* because of inclusion of the 2010 census estimates of population, lower than the higher California Department of Finance estimates used in *CED 2009*. *CED 2011 Revised* projections remain below levels witnessed in recent history in the mid and low demand cases, although they increase slightly toward the end of the forecast period due to growing electric vehicle use.

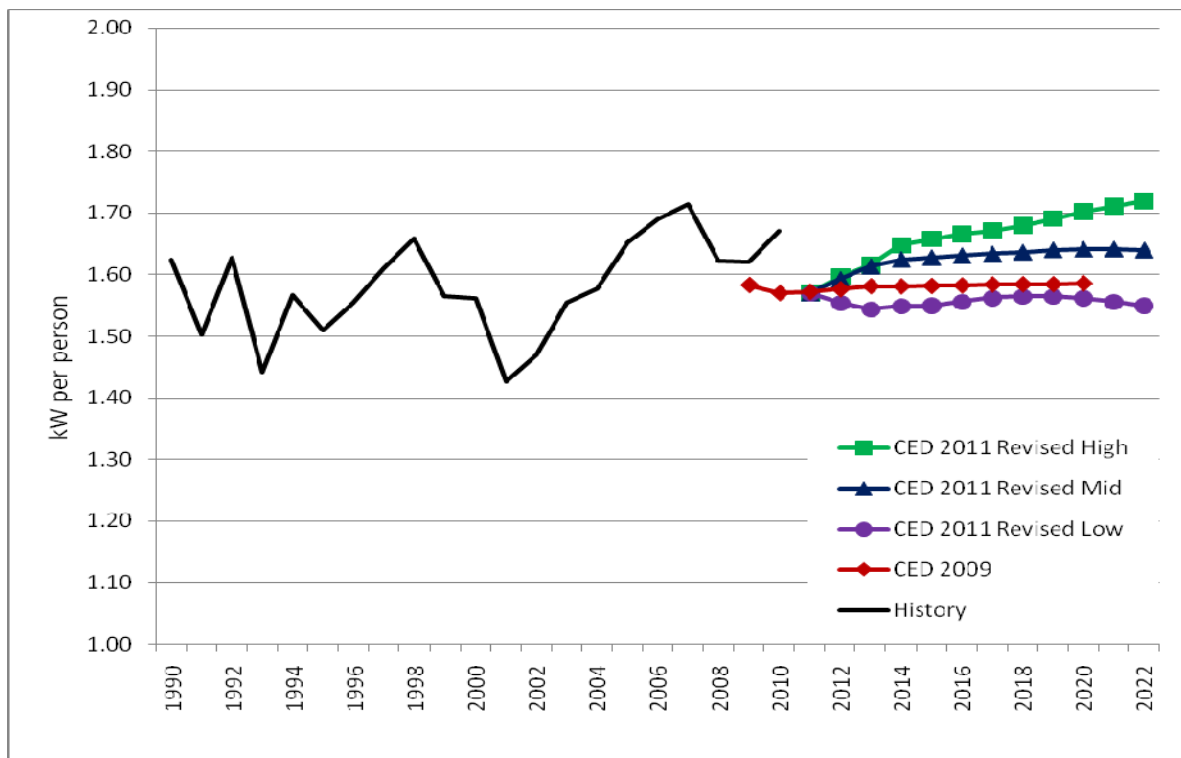
Figure 2-4 provides a comparison of per capita peak demand. *CED 2011 Revised* per capita peak scenarios follow the same pattern as the per capita consumption scenarios. The per capita peak values are projected to remain in the range of recent historical levels for the mid and low demand scenarios. The high demand scenario increases to the top end of the historical range by the end of the forecast period.

Figure 2-3: SCE Planning Area per Capita Electricity Consumption



Source: California Energy Commission, 2012

Figure 2-4: SCE Planning Area per Capita Peak Demand

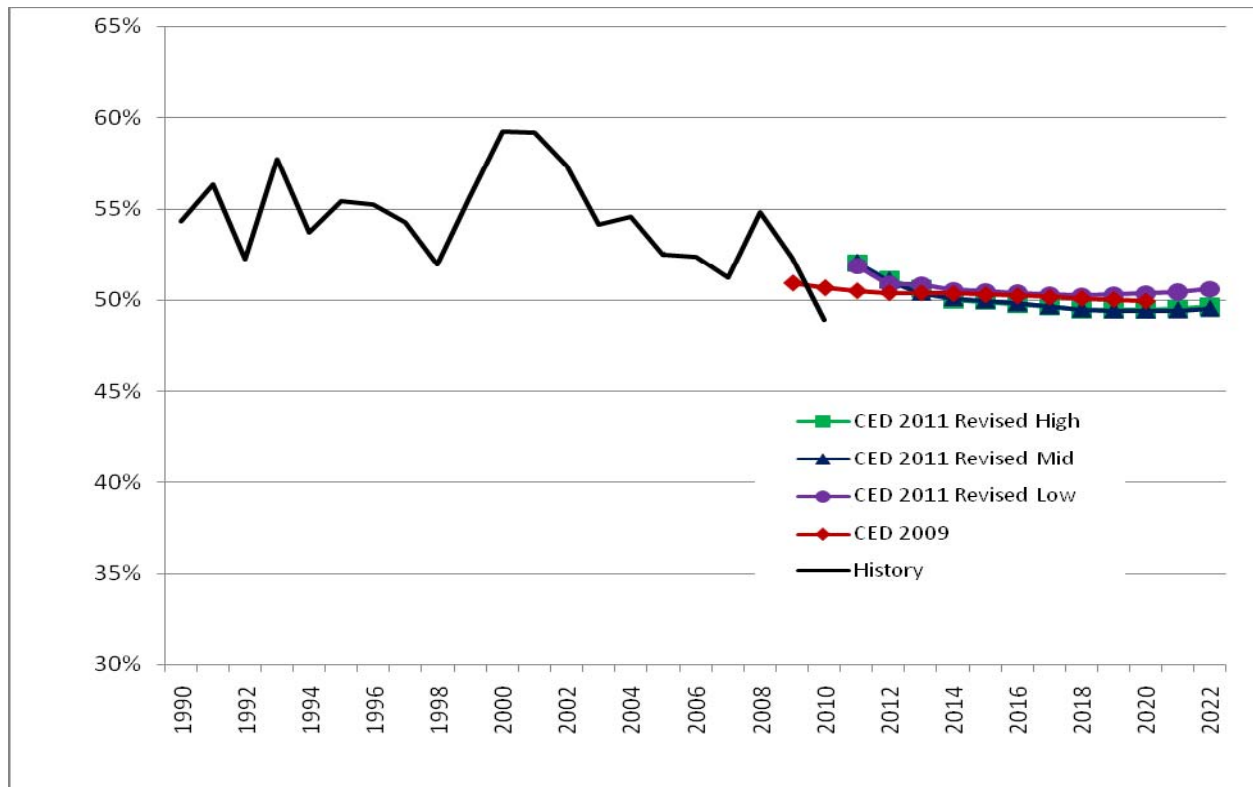


Source: California Energy Commission, 2012

Figure 2-5 compares the load factors for the *CED 2011 Revised* and *CED 2009* forecasts. The load factor is a measure of peak demand relative to average hourly consumption. Higher load factors indicate a less variable load. Historical changes in load factors are caused by variation in annual weather patterns. In Southern California, recent peak temperatures before 2006 were lower than the 57-year median value, resulting in higher-than-expected load factors. The 2006 and 2010 load factors are low because of the higher-than-normal peak conditions experienced in those years. *CED 2011 Revised* projected load factors are on the low end of the range of recent values.

Over the forecast period, the *CED 2011 Revised* load factor declines slightly, which is consistent with higher weather-sensitive load growth. Consumption in the SCE planning area is shifting toward residential and commercial sectors and away from the industrial sectors. Growth is also increasingly taking place in hotter inland areas, leading to greater saturation of central air conditioning as well as more use of air-conditioning equipment in cooler coastal areas.

Figure 2-5: SCE Planning Area Load Factors



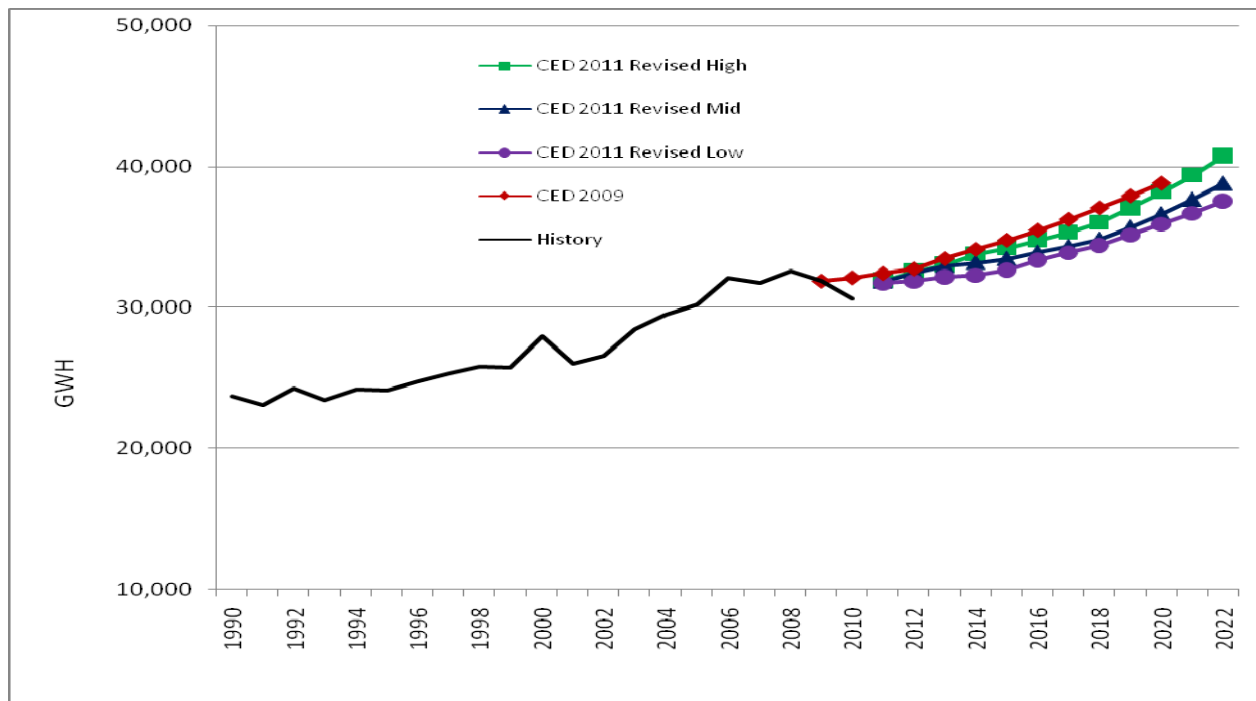
Source: California Energy Commission, 2012

Sector Level Results and Input Assumptions

Residential

Figure 2-6 Compares *CED 2011 Revised* and *CED 2009* SCE planning area residential forecasts. All *CED 2011 Revised* scenarios are lower throughout the forecast period than *CED 2009* due to lower projected number of households.

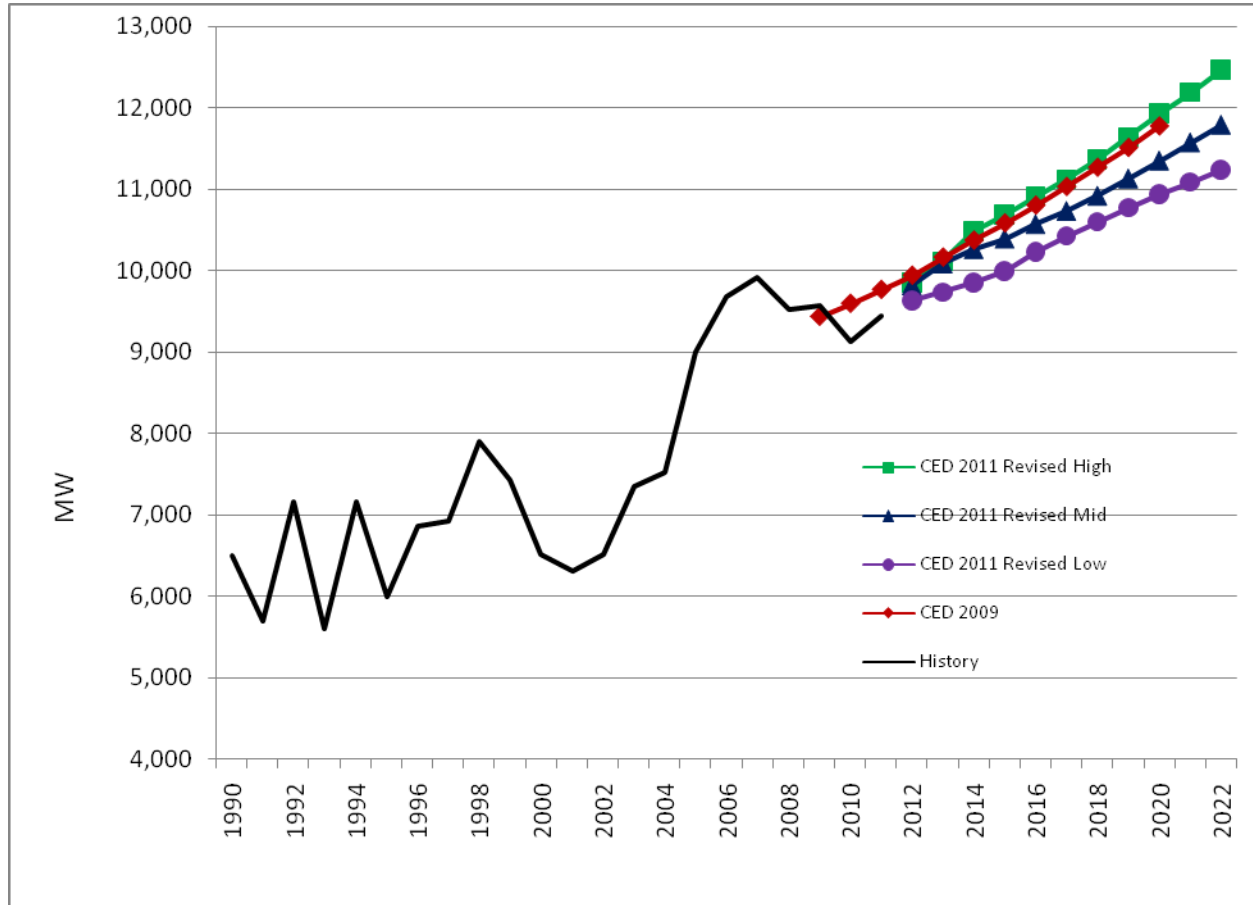
Figure 2-6: SCE Planning Area Residential Consumption



Source: California Energy Commission, 2012

Figure 2-7 Compares *CED 2011 Revised* and *CED 2009* residential peak demand forecasts. The differences between peak forecasts follow a similar pattern to differences in the consumption forecasts since the peak forecasts are driven primarily by electricity consumption forecasts.

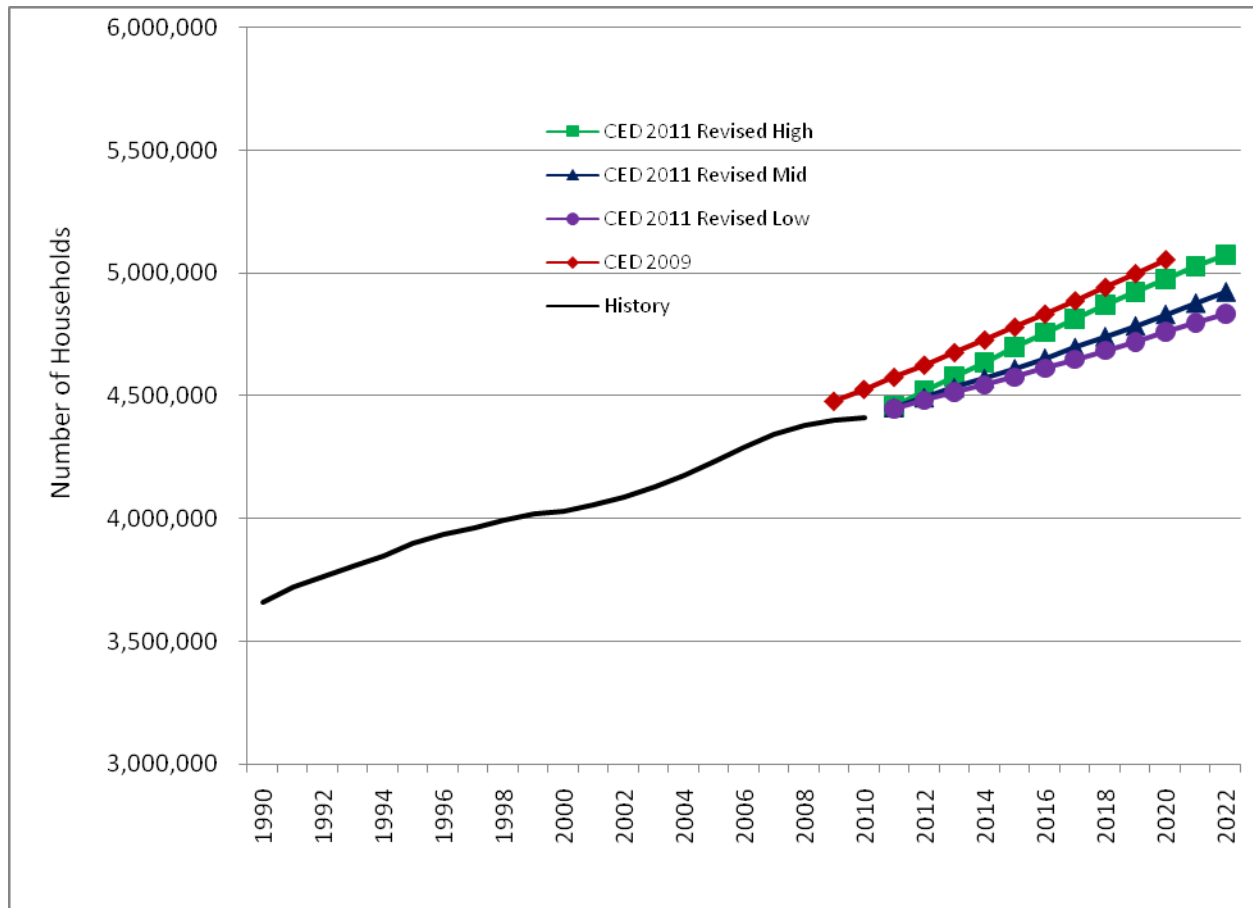
Figure 2-7: SCE Planning Area Residential Peak



Source: California Energy Commission, 2012

Figure 2-8, Figure 2-9, and Figure 2-10 Compare the residential drivers used in *CED 2011 Revised* with those used in *CED 2009*. **Figure 2-8** Compares of total household projections. All *CED 2011 Revised* scenarios are lower than the previous forecast due to a lower population and household values estimated in the 2010 census. *CED 2011 Revised* forecast now includes the most recent updated county population forecast from the California Department of Finance, which incorporates information from the 2010 census.

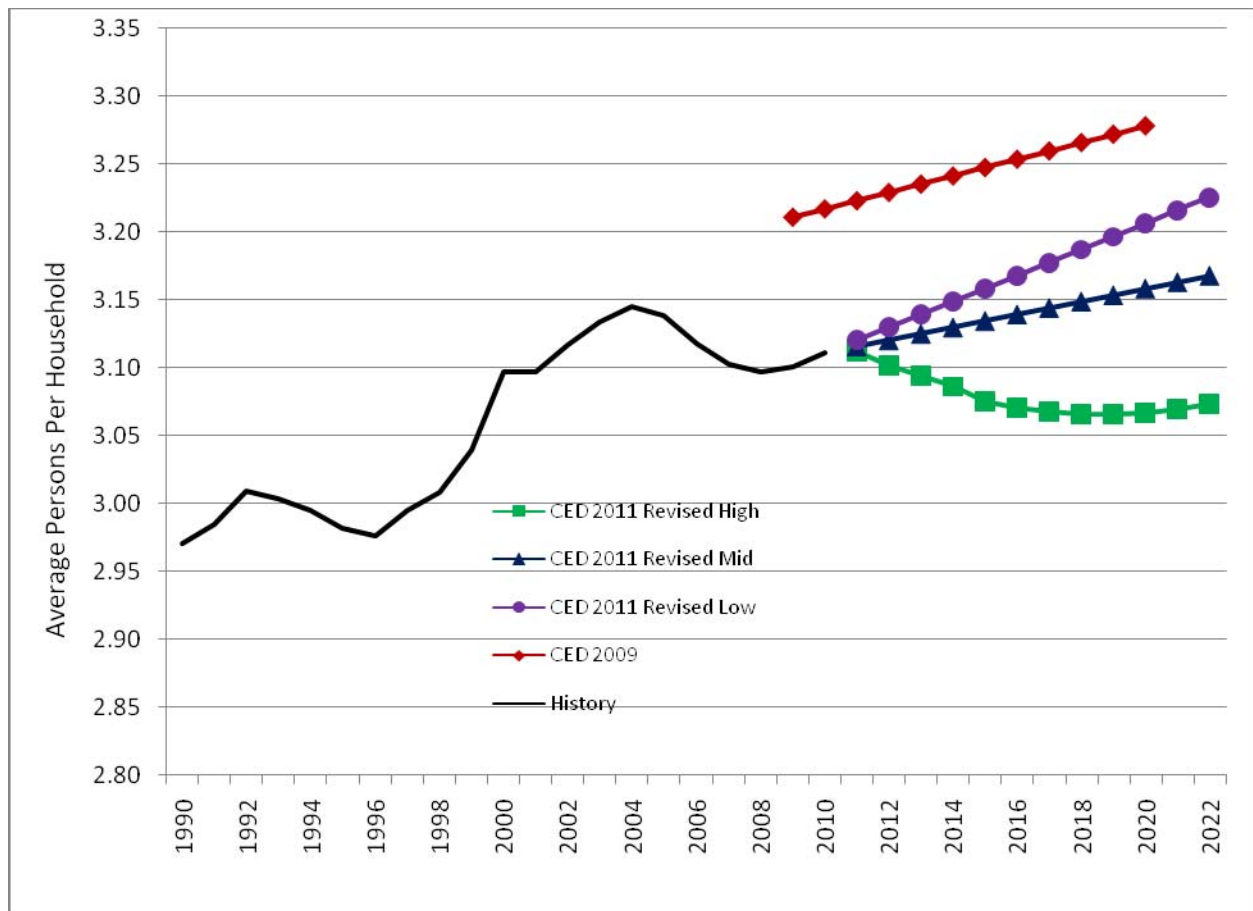
Figure 2-8: SCE Planning Area Residential Household Projections



Source: California Energy Commission, 2012

The household scenarios are based on persons-per-household estimates shown in **Figure 2-9** and total population. The high demand scenario uses lower persons-per-household projection (more households) and the low demand scenario uses higher persons-per-household projection (fewer households). See Volume 1 for a discussion of assumptions driving these projections. The mid demand scenario assumes growth in persons per household similar to the projection used in the *CED 2009* forecast. All three scenarios use the same household population forecast.

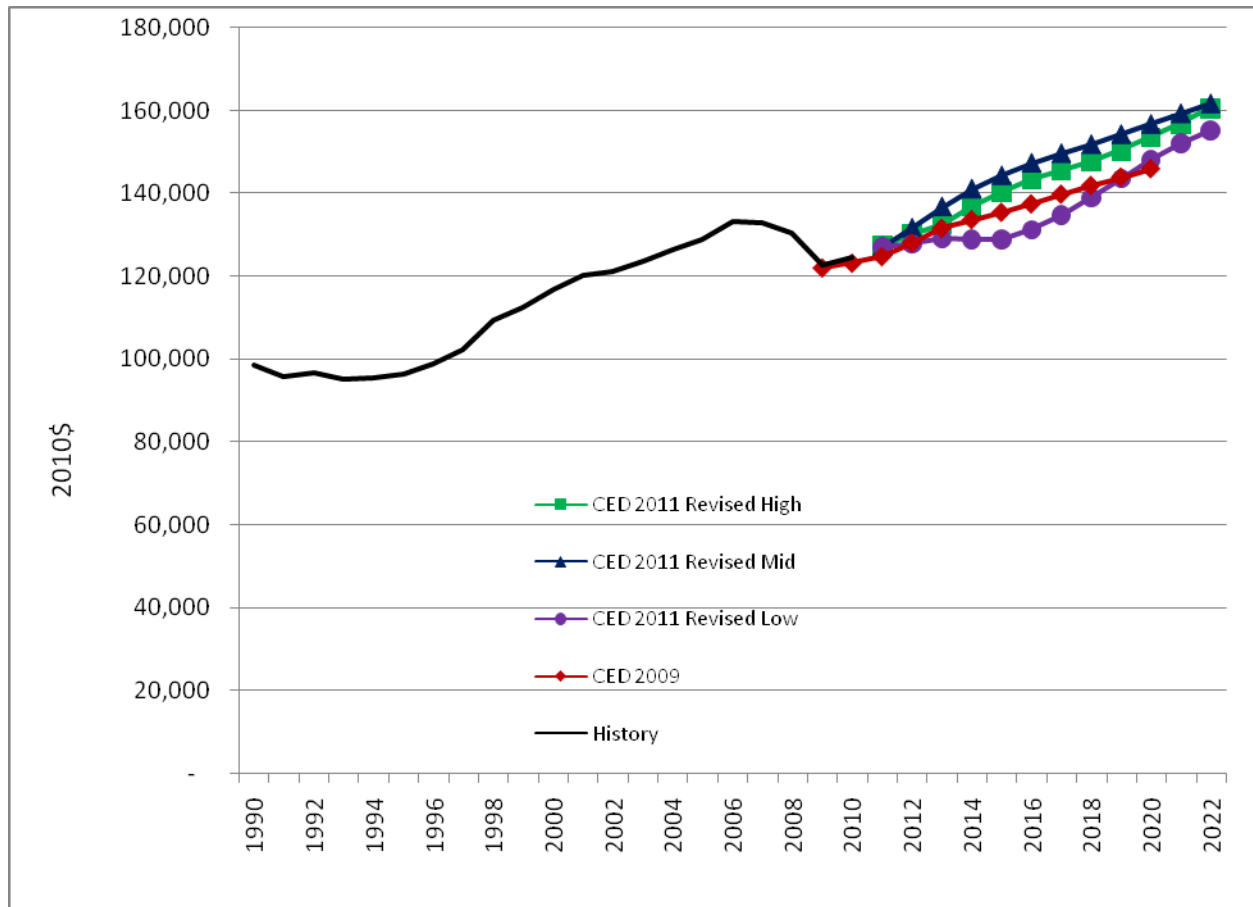
Figure 2-9: SCE Planning Area Persons per Household Projections



Source: California Energy Commission, 2012

Figure 2-10 Compares average household income (per capita income multiplied by persons per household) between the two forecasts. *CED 2011 Revised* estimates of household income growth are higher than the *CED 2009*. This is caused by higher growth projections of total personal income than were used in the previous forecast. The difference between scenarios is a function of the variation in per capita income and persons per household used to define the scenarios.

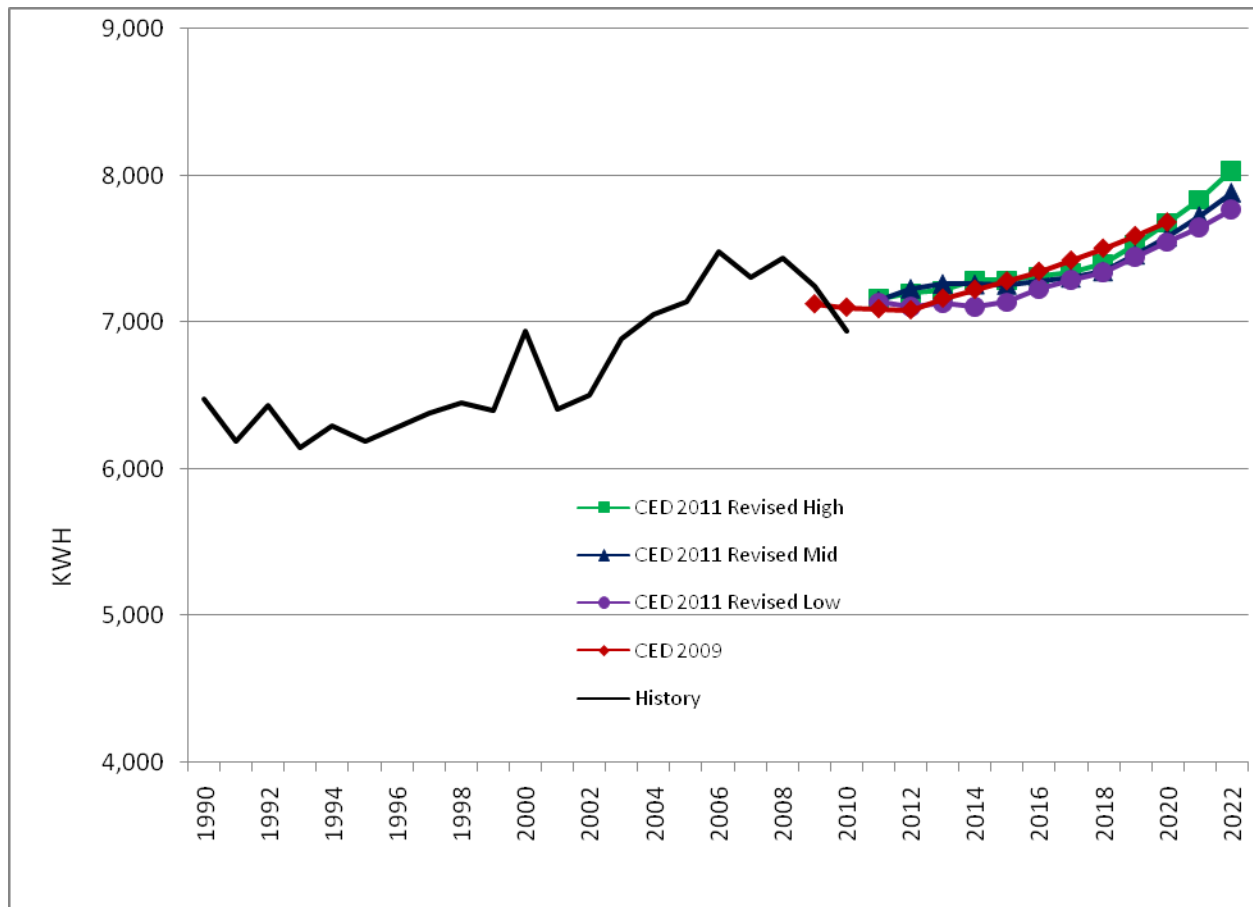
Figure 2-10: SCE Planning Area Average Household Income Projections



Source: California Energy Commission, 2012

Figure 2-11 Compares of annual electricity consumption per household. The *CED 2011 Revised* forecasts are similar to the *CED 2009* forecast. *CED 2011 Revised* consumption per household in the mid demand scenario is slightly higher throughout the forecast period than *CED 2009*. This is caused by differences in the underlying economic and demographic assumptions, including lower total population. Most of the growth in use per household after 2015 is caused by increasing numbers of electric vehicles in the residential sector. This adds about 410 kWh per household to the residential total by 2022 in the SCE planning area. Without the inclusion of electric vehicle charging, residential use would be relatively constant over the forecast period.

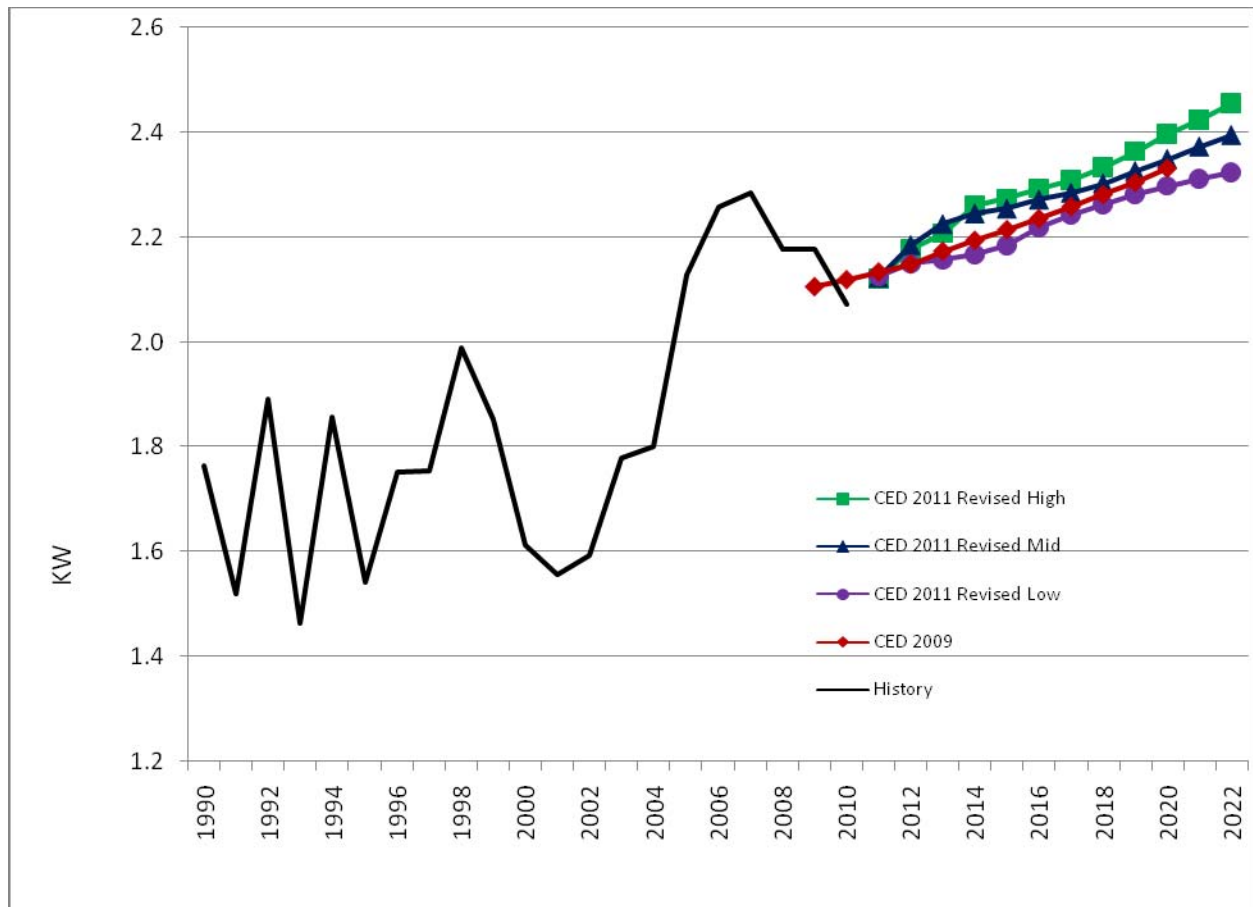
Figure 2-11: SCE Planning Area Use per Household



Source: California Energy Commission, 2012

CED 2011 Revised peak use per household, presented in **Figure 2-12**, is also higher than what was projected in *CED 2009*. This is in part driven by the short-term difference in energy forecasts. The mid-to long-term growth in peak is similar to the *CED 2009* forecast. The difference in forecast level is caused mainly by the difference in the starting point (2010).

Figure 2-12: SCE Planning Area Peak Use per Household

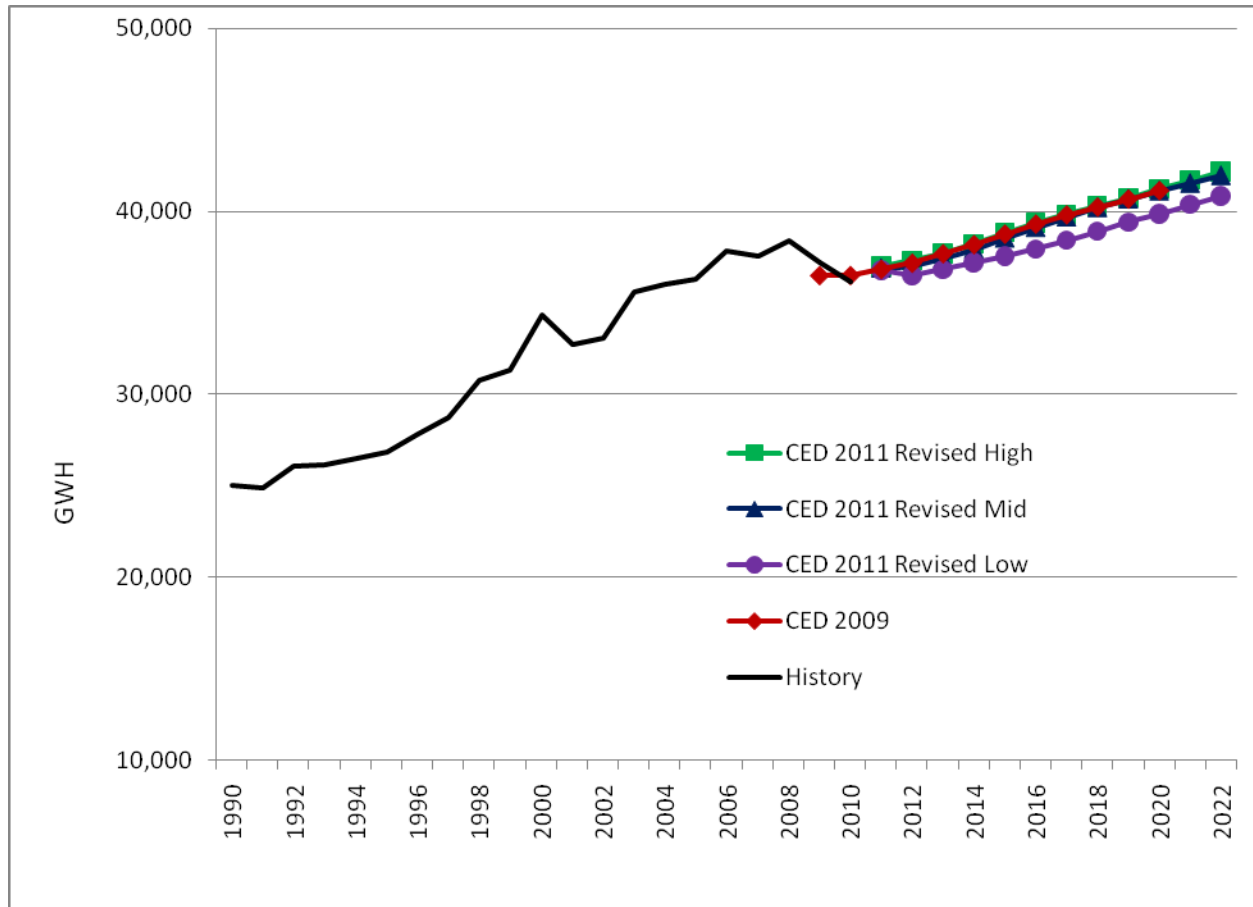


Source: California Energy Commission, 2012

Commercial Sector

Figure 2-13 Compares the commercial building sector forecasts. *CED 2011 Revised* mid and high demand scenarios are very similar to *CED 2009*. The low demand scenario is lower throughout the entire forecast period due to lower floor space projections and higher rates.

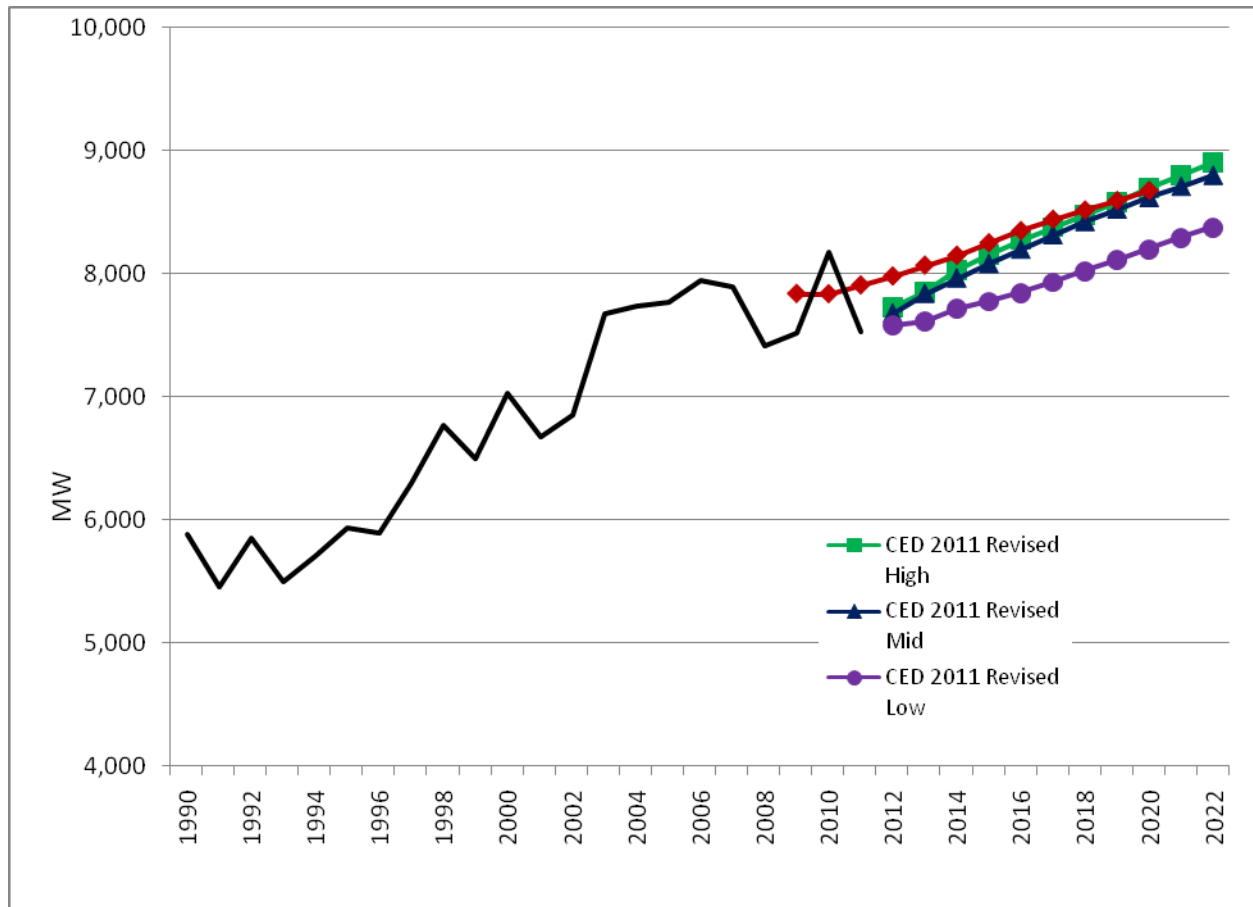
Figure 2-13: SCE Planning Area Commercial Consumption



Source: California Energy Commission, 2012

Figure 2-14 Compares the commercial peak demand forecasts. Growth in the commercial peak demand forecasts is driven primarily by the underlying electricity consumption forecasts. Therefore, the consumption and peak forecasts exhibit the same patterns. Growth in the mid and high cases is slightly faster than *CED 2009* because of the adjustment for climate change. (See Appendix A in Volume I of this report.)

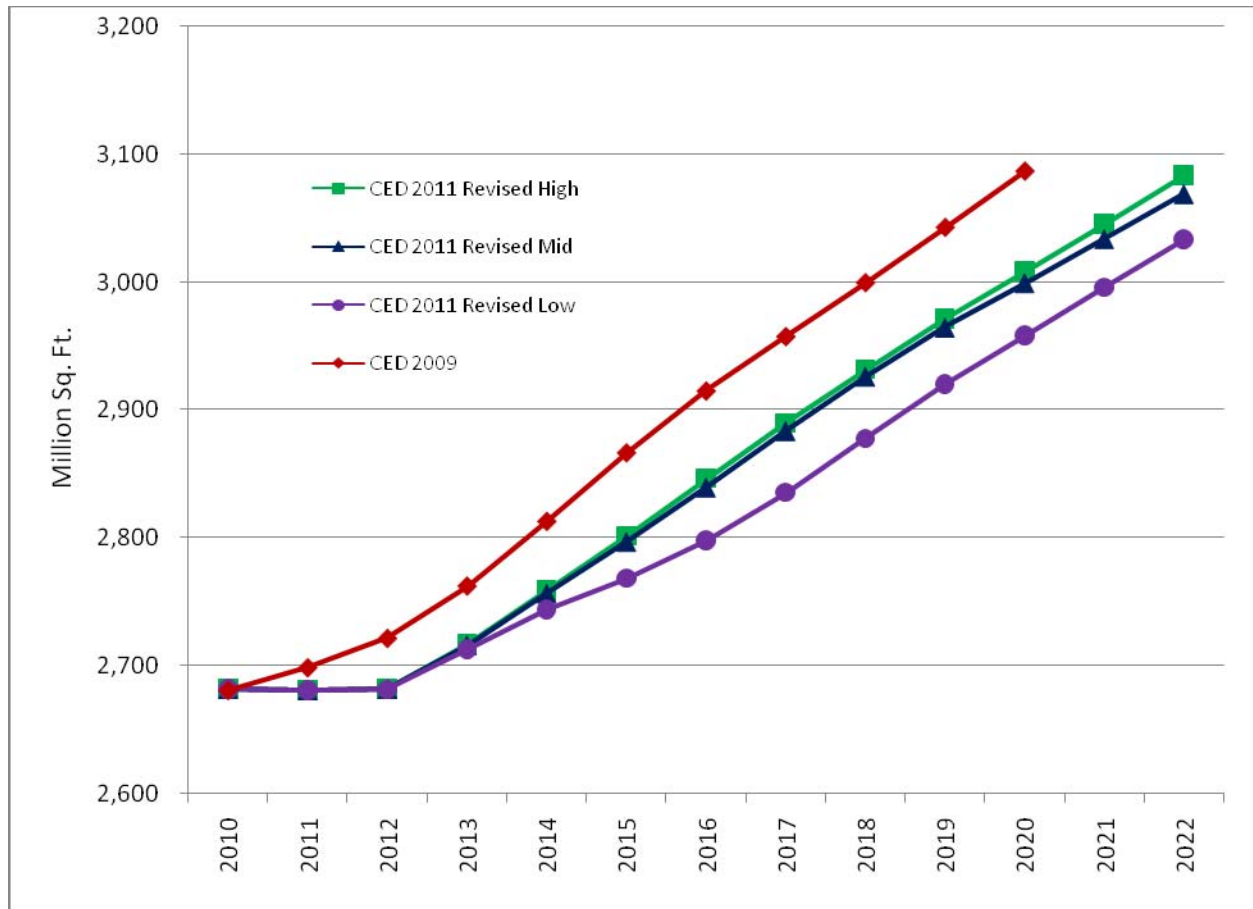
Figure 2-14: SCE Planning Area Commercial Sector Peak



Source: California Energy Commission, 2012

In staff's commercial building sector forecasting model, floor space by building type (for example, retail, schools, and offices) is the key driver of energy use for each specific building type. **Figure 2-15** Compares of total commercial floor space projections. The lower *CED 2011 Revised* floor space projections compared to *CED 2009* are caused by lower estimates of floor space stock additions in the short term, driven by slow employment growth through 2012.

Figure 2-15: SCE Planning Area Commercial Floor Space

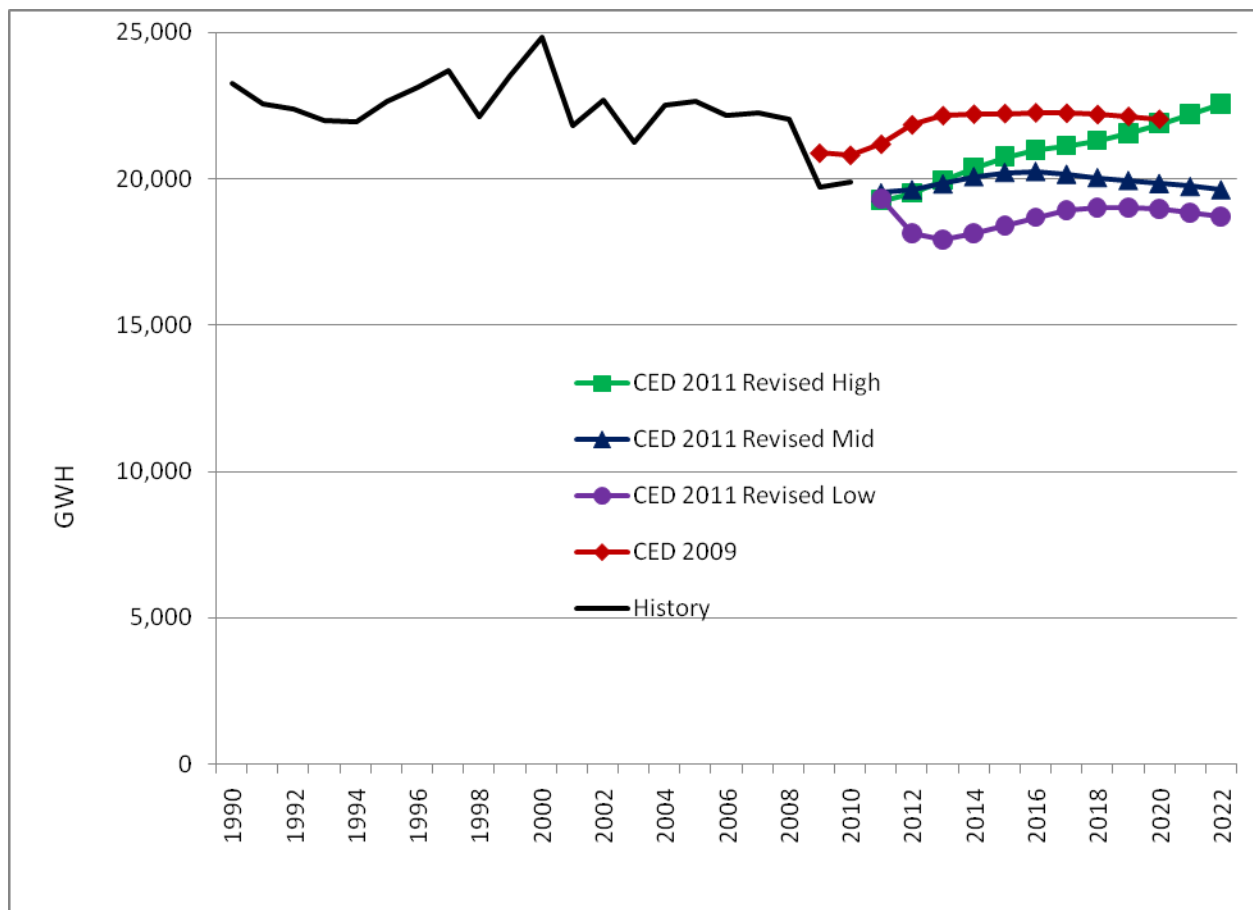


Source: California Energy Commission, 2012

Industrial Sector

Figure 2-16 Compares industrial sector electricity consumption for the SCE planning area. *CED 2011 Revised* scenarios start from a lower point than *CED 2009* forecast, and the mid and low demand cases remain below *CED 2009* throughout the forecast period. Consumption in the high demand scenario is above *CED 2009* at the end of the forecast period, a result of relatively high growth in manufacturing output.

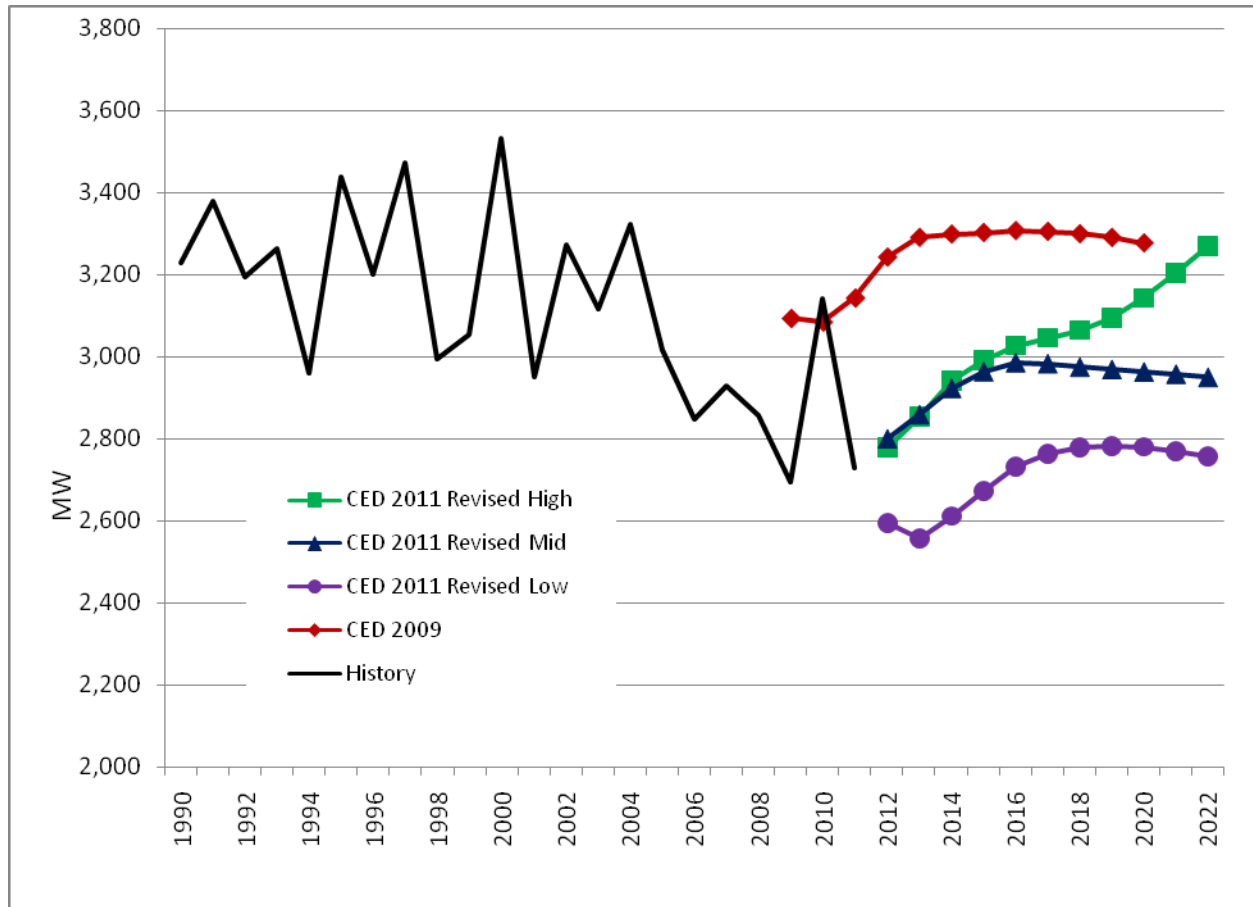
Figure 2-16: SCE Planning Area Industrial Consumption



Source: California Energy Commission, 2012

Figure 2-17 compares of the industrial sector peak forecasts. Forecasted growth patterns are similar to those seen for consumption.

Figure 2-17: SCE Planning Area Industrial Sector Peak

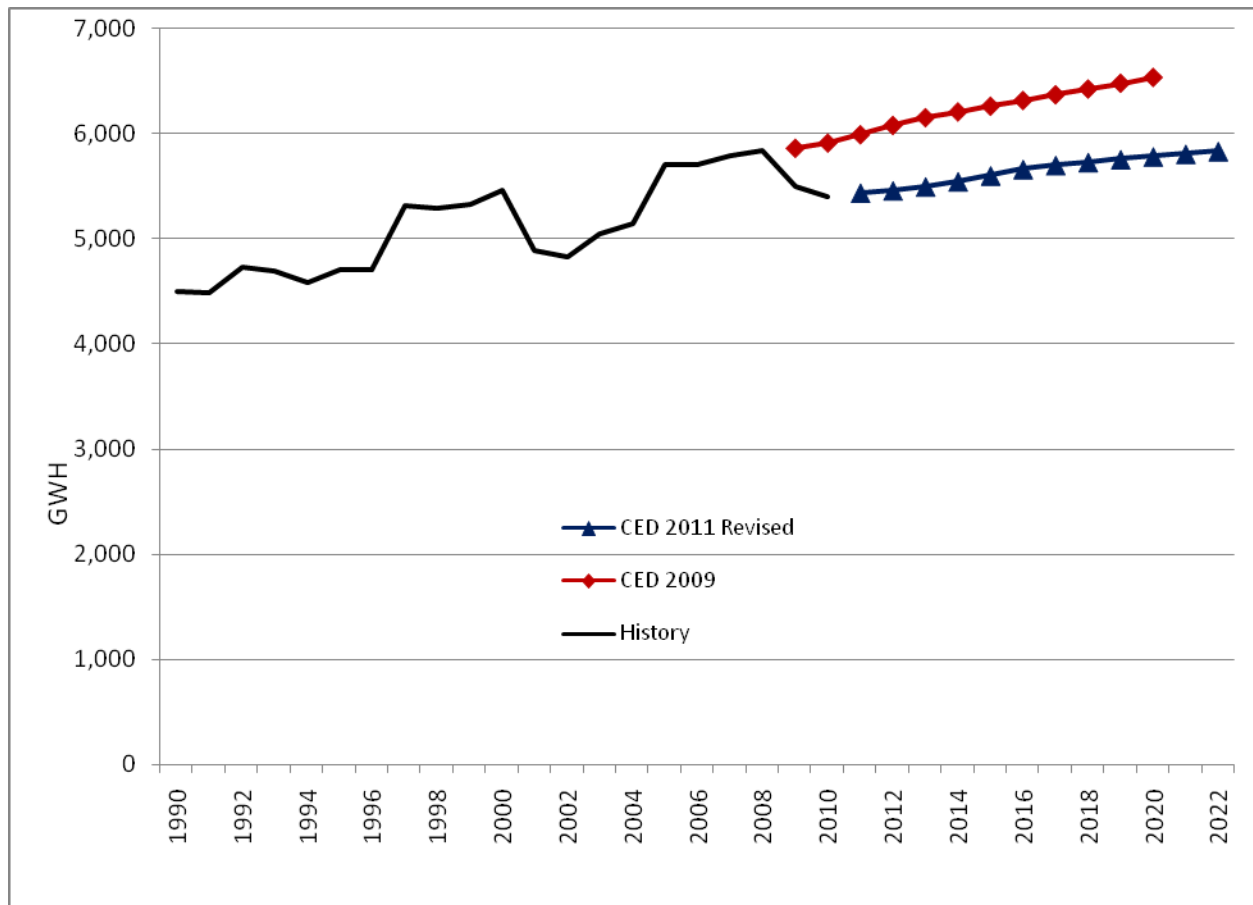


Source: California Energy Commission, 2012

Other Sectors

Figure 2-18 Compares the electricity consumption forecasts for the transportation, communication, and utilities (TCU) sector, which includes street lighting. In this case, a single scenario was run.² *CED 2011 Revised* is lower than *CED 2009* given a lower starting point, a result of more recent sector historic consumption estimates from QFER filings.

Figure 2-18: SCE Planning Area Transportation, Communication, Utilities, and Street lighting Sector Electricity Forecasts

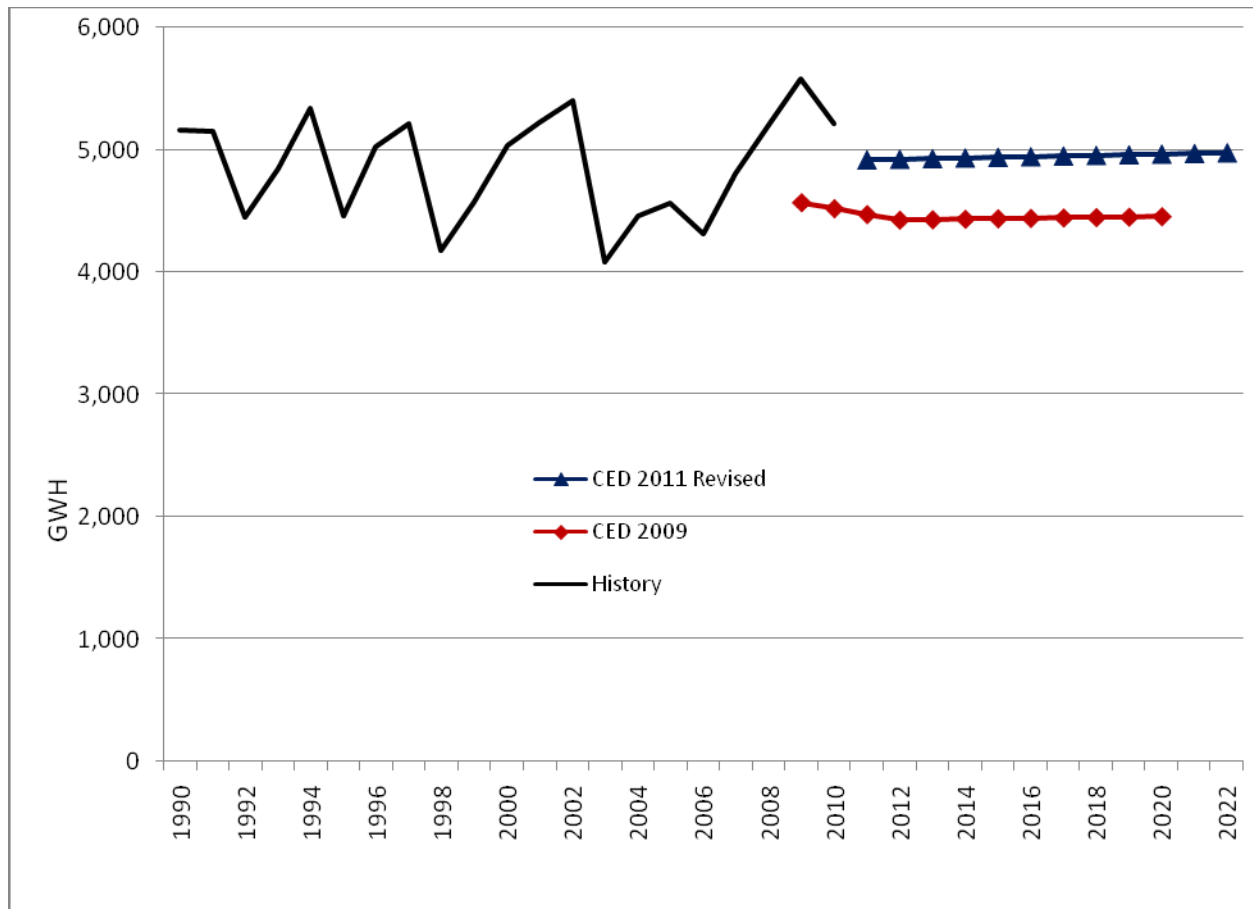


Source: California Energy Commission, 2012

¹Growth in TCU consumption depends mainly on population, for which there is only one scenario.

Figure 2-19 Compares the electricity consumption forecasts for the agriculture and water pumping sectors. The econometric estimation for SCE uses population and found no price responsiveness; thus, there is only one *CED 2011 Revised* scenario. The *CED 2011 Revised* agriculture and water-pumping forecast is higher in the short term than *CED 2009* due to a higher starting point based on historical consumption estimates. The *CED 2011 Revised* forecast is relatively constant over the forecast period.

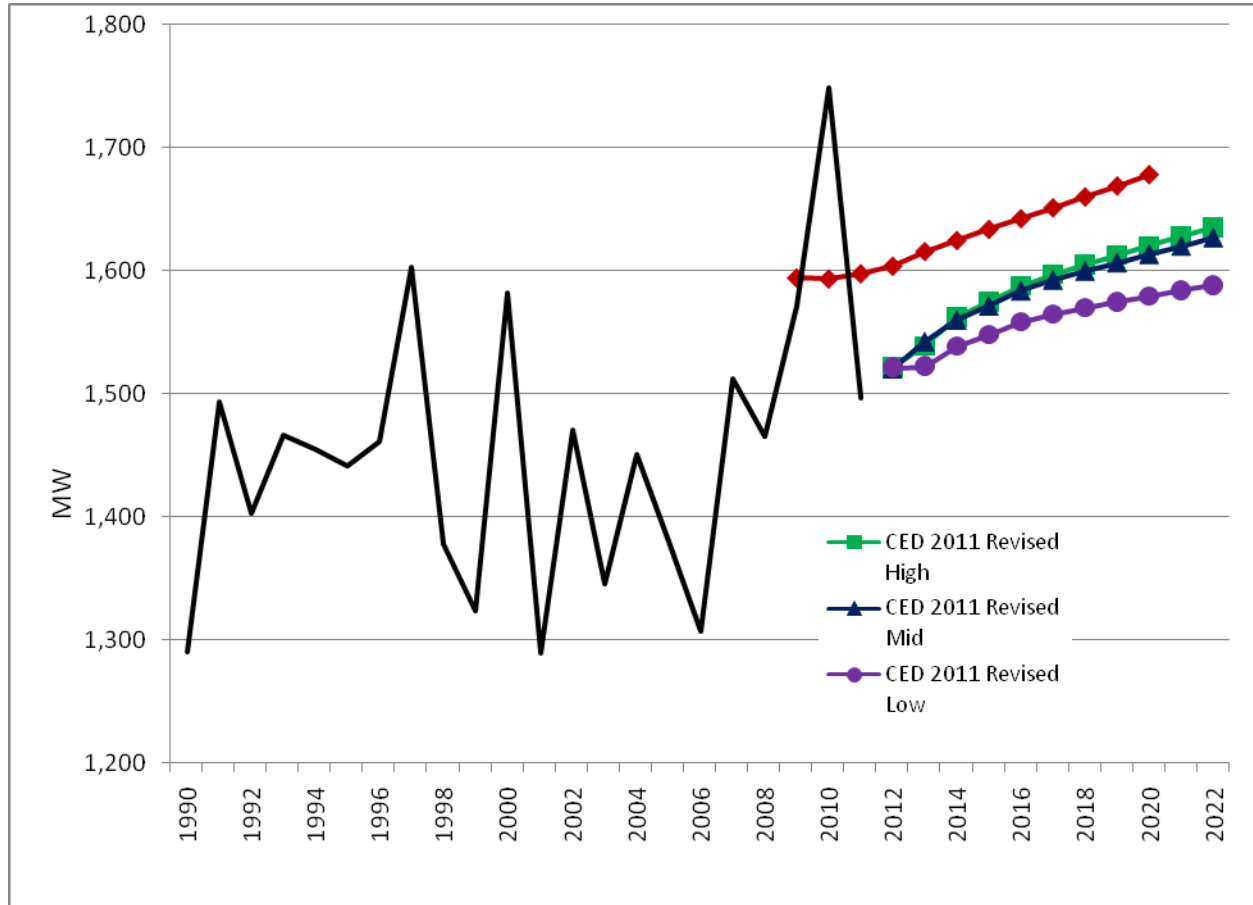
Figure 2-19: SCE Planning Area Agriculture and Water Pumping Sector Forecast



Source: California Energy Commission, 2012

Figure 2-20 provides a comparison of the combined peak for these sectors. The *CED 2011 Revised* peak forecast is somewhat lower than *CED 2009* because of an estimated lower starting point. The growth rates between the two forecasts are similar.

Figure 2-20: SCE Planning Area Other Sector Peak

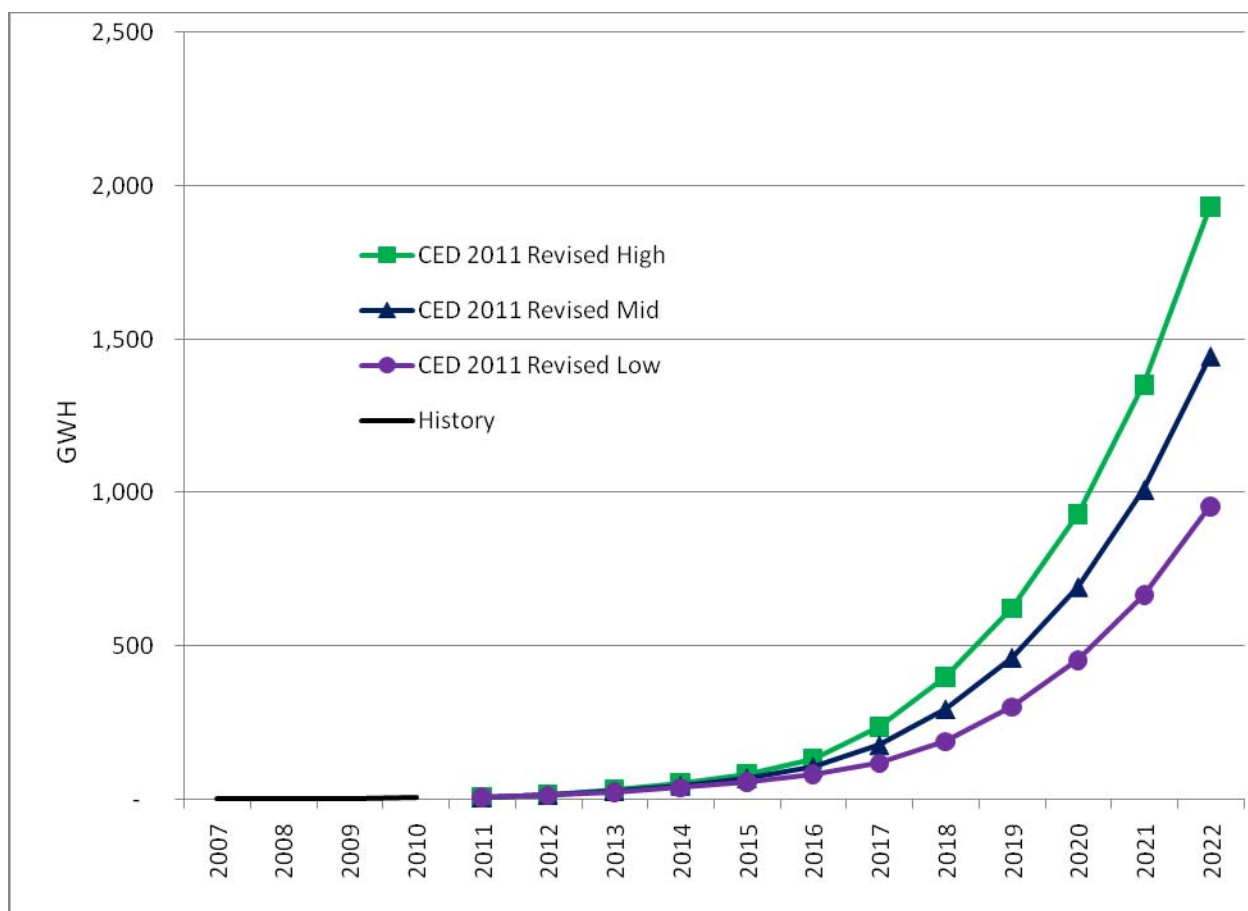


Source: California Energy Commission, 2012

Electric Vehicles

Electricity consumption by electric vehicles is expected to increase from 7 GWh in 2011 to almost 1,000 GWh in the low demand scenarios and to more than 1,900 GWh in the high case by 2022. Staff assumed most recharging would occur during off-peak hours, so peak impacts are expected to be relatively small, causing an increase of 41 MW in the low demand case and 83 MW in the high scenario by the end of the forecast period. **Figure 2-21** presents the SCE planning area electric vehicle consumption forecast for each of the demand scenarios.

Figure 2-21: SCE Electricity Consumption of Electric Vehicles



Source: California Energy Commission, 2012

Self-Generation

The peak demand forecast is reduced by self-generation, including the effects of SGIP, CSI, and other programs, as discussed in Chapter 1 of Volume 1. The effects of these programs are forecast based on recent trends in installations and a residential predictive model. **Table 2-2** shows *CED 2011 Revised* forecasts of peak impacts from photovoltaic (PV) and non-PV self-generation. Only residential PV impacts varied in the demand scenarios, based on differences in number of households and energy rates. Staff projects between 495 to 650 MW of peak reduction from PV systems in the SCE planning area by 2022. Peak reductions are based on installed system capacities ranging from 878 MW by 2022 in the high demand case to 1,131 MW by 2022 in the low demand case.

Table 2-2: SCE Planning Area Self-Generation Peak Impacts (MW)

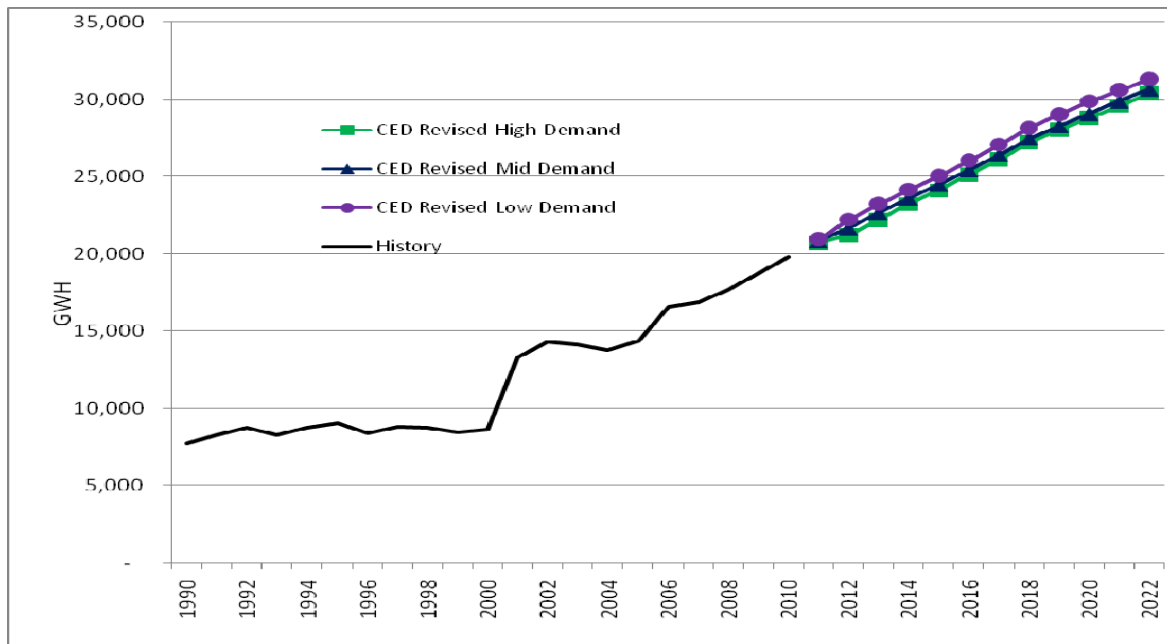
	1990	2000	2010	2015	2020	2022
Non-Photovoltaic Self-Generation	489.71	517.43	784.32	807.47	824.38	847.18
Photovoltaic, Low Demand	0.00	0.32	115.25	365.81	521.21	649.13
Photovoltaic, Mid Demand	0.00	0.32	115.25	342.21	448.75	551.92
Photovoltaic, High Demand	0.00	0.32	115.25	334.84	416.28	494.99
Total Self-Generation, Low Demand	489.71	517.75	899.58	1173.28	1345.59	1496.31
Total Self-Generation, Mid Demand	489.71	517.75	899.58	1149.68	1273.13	1399.10
Total Self-Generation, High Demand	489.71	517.75	899.58	1142.31	1240.66	1342.17

Source: California Energy Commission, 2012

Conservation/Efficiency Impacts

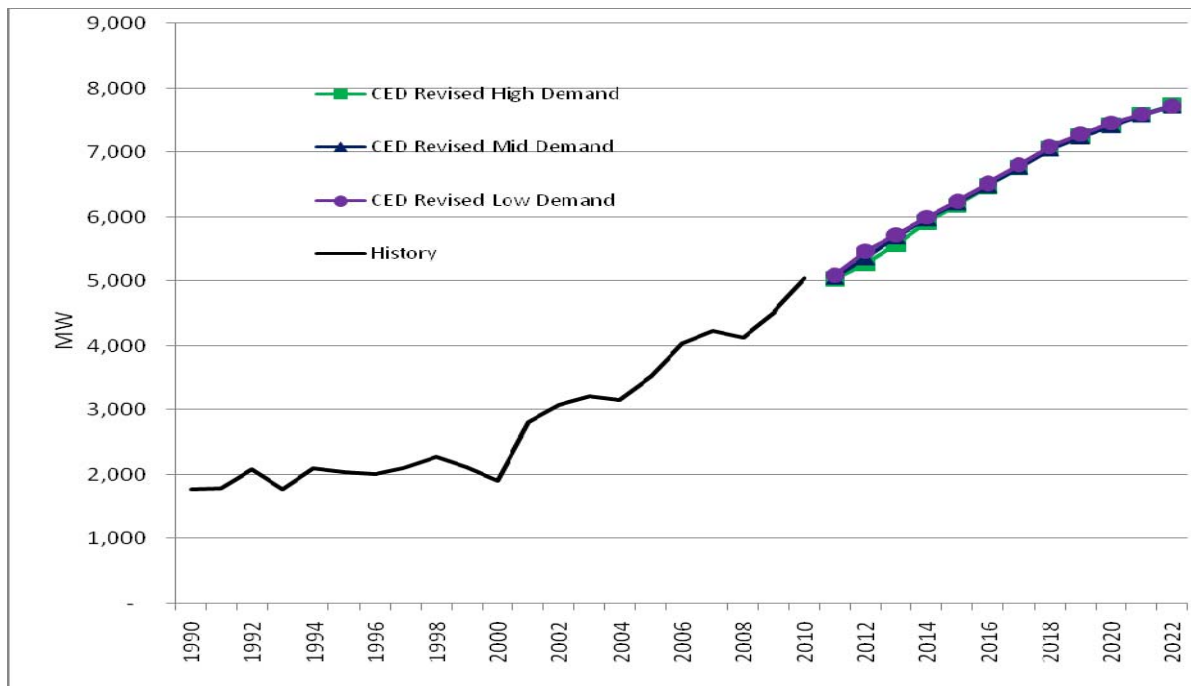
Staff has spent a great deal of time refining methods to account for energy efficiency and conservation impacts while preparing this forecast. **Figure 2-22** and **Figure 2-23** on the next page show committed electricity consumption and peak efficiency savings estimates from all committed sources, including building and appliance standards; utility programs implemented before 2013; and price and other effects. Projected savings impacts are higher the lower the demand scenario, since price and program effects are inversely related to the demand outcome. Peak results show less difference among the scenarios, since residential consumption savings totals are very similar and the residential sector has a disproportionately large effect on peak demand.

Figure 2-22: SCE Planning Area Electricity Consumption Savings Estimates



Source: California Energy Commission, 2012

Figure 2-23: SCE Planning Area Electricity Peak Savings Estimates



Source: California Energy Commission, 2012

Table 2-3 presents estimated savings for building and appliance standards in the mid demand case for selected years. Total standards impacts are higher in the high demand case by 1.5-2.0 percent because of higher home and commercial floor space construction and 1.5-2.0 percent lower in the low demand case. The standards savings estimates include the 2010 revision to Title 24 building standards as well as AB 1109 lighting and television standard savings. Savings are measured against a baseline of 1975, so they incorporate more than 30 years of impacts. Volume 1 provides more detail on staff work related to energy efficiency and conservation.

Table 2-3: SCE Planning Area Electricity Standards Savings Estimates

Electricity Consumption Savings (GWH)							
	Residential			Commercial			
	Building Standards	Appliance Standards	Total	Building Standards	Appliance Standards	Total	Total Standards
1990	1,245	811	2,056	511	360	871	2,927
2000	1,674	2,462	4,136	1,390	1,017	2,407	6,544
2010	2,345	5,612	7,958	2,721	1,769	4,490	12,448
2015	3,013	7,714	10,728	3,373	2,251	5,624	16,352
2020	3,720	9,384	13,104	4,306	3,010	7,316	20,420
2022	3,942	9,732	13,674	4,644	3,162	7,806	21,480
Electricity Peak Demand Savings (MW)							
	Residential			Commercial			
	Building Standards	Appliance Standards	Total	Building Standards	Appliance Standards	Total	Total Standards
1990	341	222	563	120	85	205	768
2000	389	572	961	285	208	493	1,454
2010	700	1,675	2,374	616	400	1,016	3,390
2015	936	2,397	3,333	707	472	1,179	4,513
2020	1,153	2,908	4,061	903	631	1,534	5,595
2022	1,198	2,958	4,156	974	663	1,637	5,792

Source: California Energy Commission, 2012

CHAPTER 3: San Diego Gas & Electric Planning Area

The SDG&E planning area includes SDG&E bundled retail customers and customers served by various energy service providers using the SDG&E distribution system to deliver electricity to end users.

This chapter is organized similarly to those for the other planning areas. Forecasts of total consumption, per capita consumption, peak loads, and load factors give an overview of SDG&E's projected electricity demand in the coming decade. This precedes a more detailed discussion of key sector-level inputs and results. Results for self-generation, efficiency, conservation, and electric vehicles are found toward the end of this chapter.

This report presents three demand scenarios—high, mid, and low. The high case is characterized by low electricity rates, high population growth, high levels of efficiency, and low self-generation. Inversely, the low case is characterized by high electricity rates, low population, and so forth. The tables and charts presented throughout this chapter show results for all three *CED 2011 Revised* forecast scenarios alongside *CED 2009* for reference.

Forecast Results

Table 3-1 on the next page compares the planning area electricity consumption and peak demand forecasts for selected years. For both consumption and peak demand, growth rates starting in 2011 are shown in order to compare weather-normalized growth, since consumption in 2010 was reduced significantly because of a very mild weather year overall while a heat storm event in September 2010 yielded a relatively high peak.

Due to a lower starting point, all three scenarios project a lower level of consumption than *CED 2009* in the short term. However, the overall annual growth rate from 2011-2020 is higher than *CED 2009* in all three scenarios.

The mid demand scenario estimates 1.90 percent average annual growth in consumption and 1.97 percent annual growth in peak demand from 2011-2022. By 2022, total consumption in the high case is projected to be 6.2 percent higher than the low case. The spread between peak demand scenarios is slightly wider, with the high case projected to be 8 percent higher than the low case.

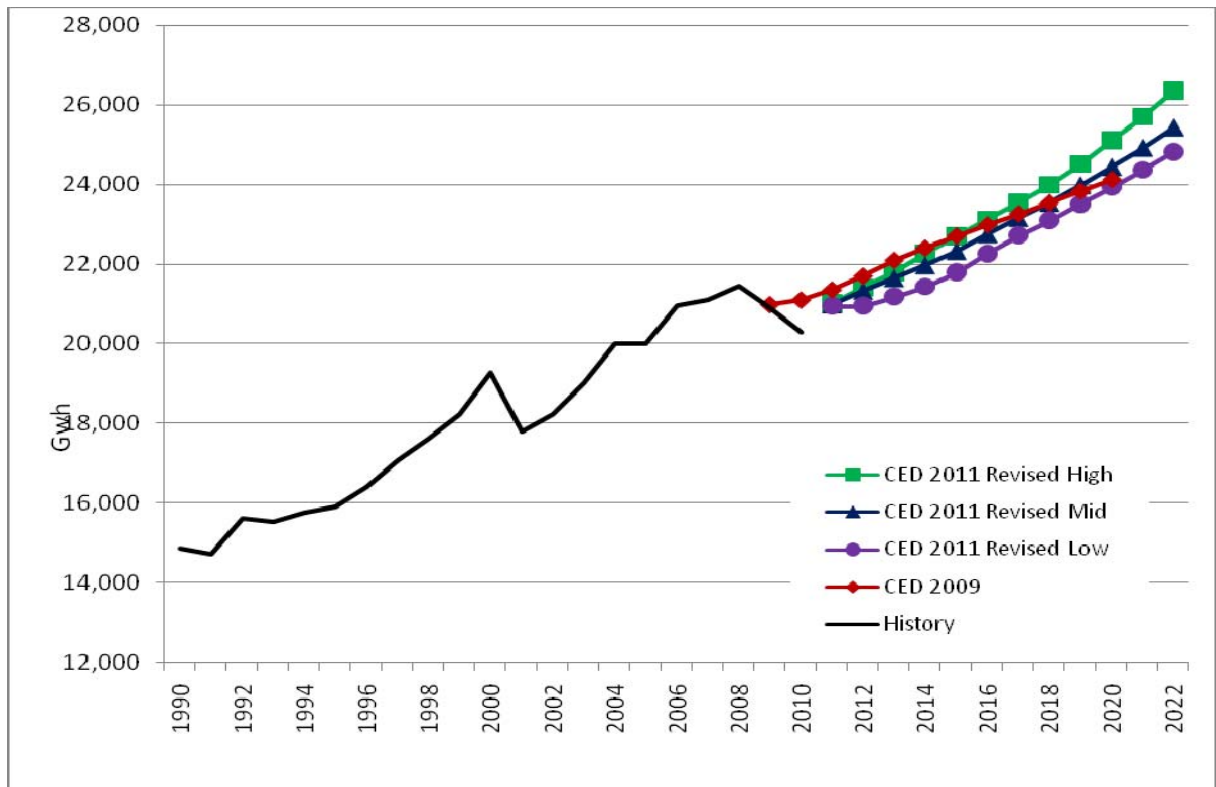
Table 3-1: SDG&E Planning Area Forecast Comparison

Consumption (GWh)				
	<i>CED 2009 (Dec. 2009)</i>	<i>CED 2011 Revised-High</i>	<i>CED 2011 Revised-Mid</i>	<i>CED 2011 Revised-Low</i>
1990	14,926	14,863	14,863	14,863
2000	19,294	19,283	19,283	19,283
2010	21,100	20,300	20,300	20,300
2011	21,354	21,014	20,992	20,937
2015	22,707	22,692	22,338	21,777
2020	24,119	25,093	24,439	23,923
2022	--	26,345	25,432	24,807
Average Annual Growth Rates				
1990 - 2000	2.60%	2.64%	2.64%	2.64%
2000 - 2010	0.90%	0.52%	0.52%	0.52%
2011 - 2015	1.55%	1.94%	1.57%	0.99%
2011 - 2020	1.36%	1.99%	1.70%	1.66%
2011 - 2022	--	2.20%	1.90%	1.68%
Peak (MW)				
	<i>CED 2009 (Dec. 2009)</i>	<i>CED 2011 Revised-High</i>	<i>CED 2011 Revised-Mid</i>	<i>CED 2011 Revised-Low</i>
1990	2,978	2,978	2,978	2,978
2000	3,485	3,485	3,485	3,485
2011	4,578	4,355	4,355	4,355
2011*	4,578	4,435	4,435	4,435
2015	4,856	4,895	4,839	4,651
2020	5,157	5,439	5,323	5,103
2022	--	5,660	5,499	5,239
Average Annual Growth Rates				
1990 - 2000	1.58%	1.58%	1.58%	1.58%
2000 - 2011	2.51%	2.05%	2.05%	2.05%
2011* - 2015	1.48%	2.50%	2.20%	1.20%
2011* - 2020	1.33%	2.29%	2.05%	1.57%
2011* - 2022	--	2.24%	1.97%	1.53%
Historical values are shaded.				
*Weather normalized: <i>CED 2011 Revised</i> uses a weather-normalized peak value derived from the actual 2011 peak for calculating growth rates during the forecast period.				

Source: California Energy Commission, 2012

At the start of the forecast period, the *CED 2011 Revised* mid case consumption forecast is 1.7 percent lower than the *CED 2009* projection. As **Figure 3-1** shows, the *CED 2009* and *CED 2011 Revised* low and mid case forecasts converge to roughly the same value by 2020.

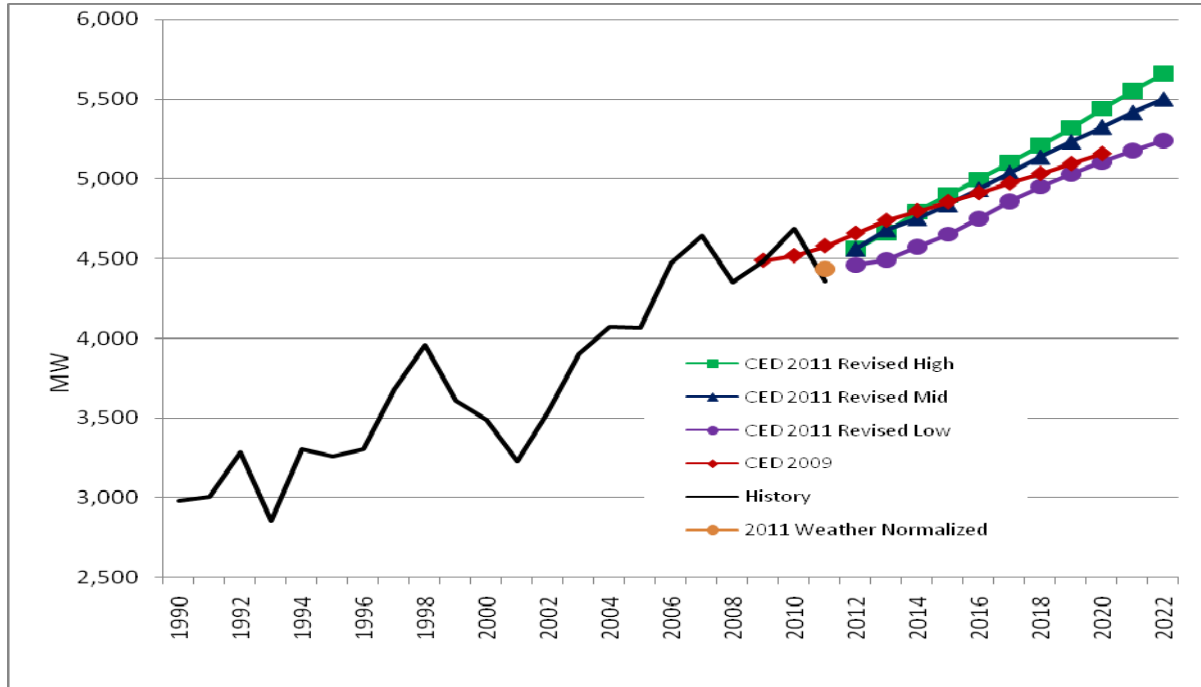
Figure 3-1: SDG&E Planning Area Electricity Forecast



Source: California Energy Commission, 2012

The *CED 2011 Revised* planning area peak demand forecast is about 2.1 percent lower than the *CED 2009* forecast in the beginning of the forecast period, as shown in **Figure 3-2**. By the end of the forecast period, the *CED 2011 Revised* mid forecast is 3.2 percent higher. The peak forecast assumes normal weather conditions, and the 2011 weather normalized peak value is estimated to be higher than the actual recorded peak load for that year.

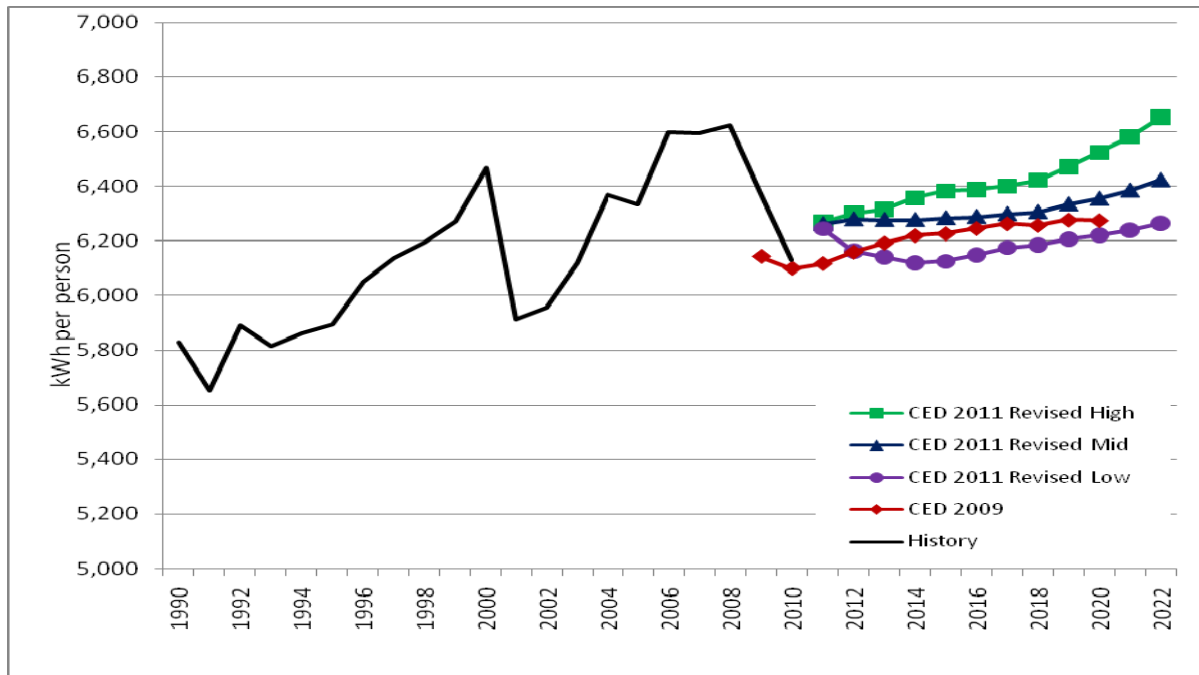
Figure 3-2: SDG&E Planning Area Peak



Source: California Energy Commission, 2012

Figure 3-3 compares forecasts of per capita electricity consumption. Per capita consumption in the *CED 2011 Revised* forecast for all demand scenarios is higher than the *CED 2009* forecast in 2011, as a result of a reduction in population per the 2010 census. The revised mid case maintains a relatively flat trajectory over the first half of the forecast period and then increases moderately toward the end. The moderate growth toward the end of all three of the revised scenarios indicates the effect of an increasing number of electric vehicles.

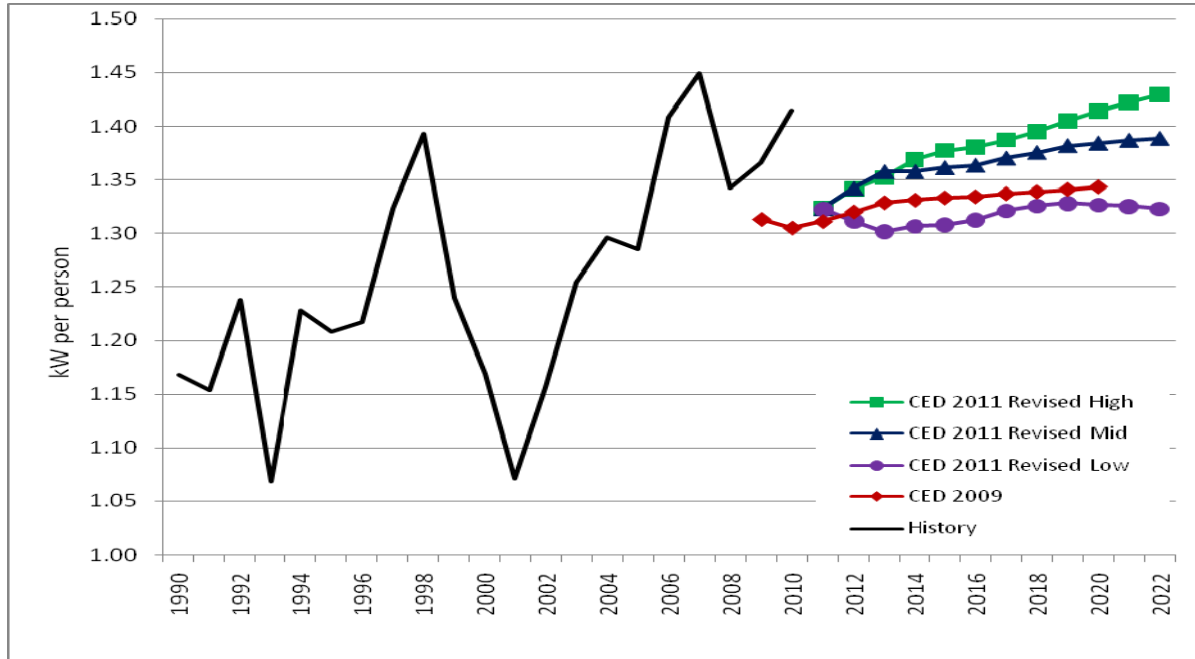
Figure 3-3: SDG&E Planning Area per Capita Electricity Consumption



Source: California Energy Commission, 2012

Figure 3-4 compares forecasts of per capita peak demand. The *CED 2011 Revised* mid demand scenario grows rapidly at the start of the forecast period as the California economy recovers and then grows at a similar rate as *CED 2009* towards the end of the forecast period.

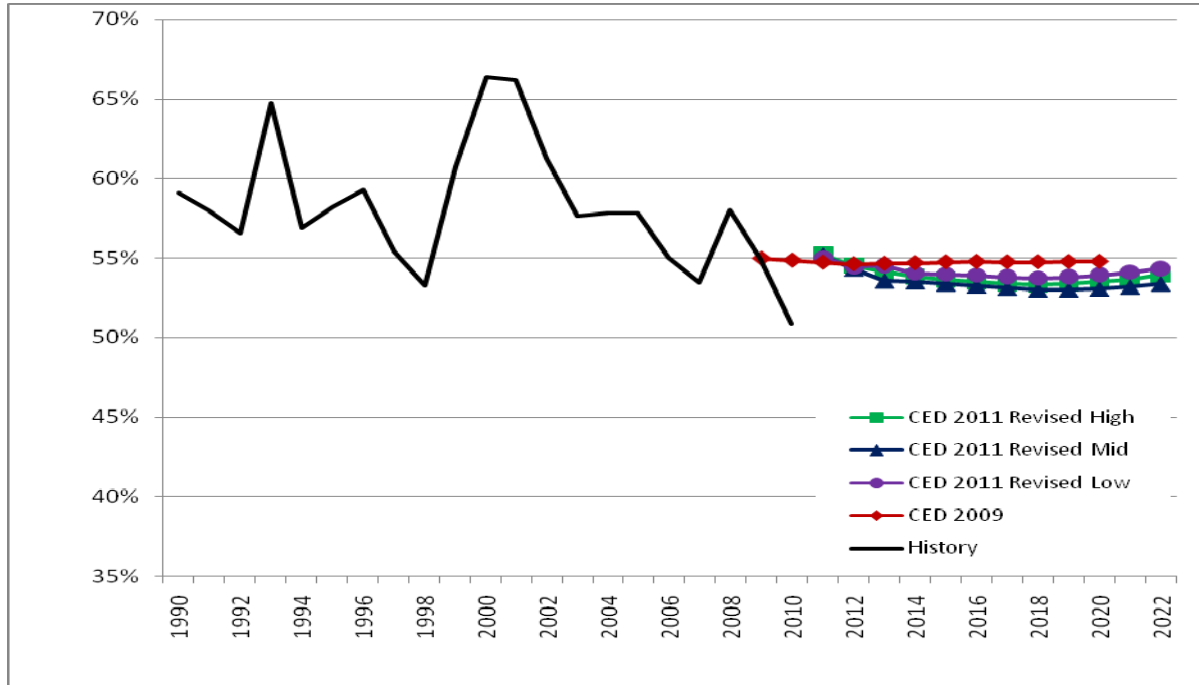
Figure 3-4: SDG&E Planning Area per Capita Peak Demand



Source: California Energy Commission, 2012

Figure 3-5 compares the respective forecast load factors. High load factors observed from 1998-2005 are a product of lower-than-average peak temperatures as well as reaction to the energy crisis. The projected load factors, based on average temperatures and a return to normal air-conditioning use patterns, should be lower than these recent values, with the exception of 2010, when Southern California experienced an unusually severe heat storm.

Figure 3-5: SDG&E Planning Area Peak Load Factors



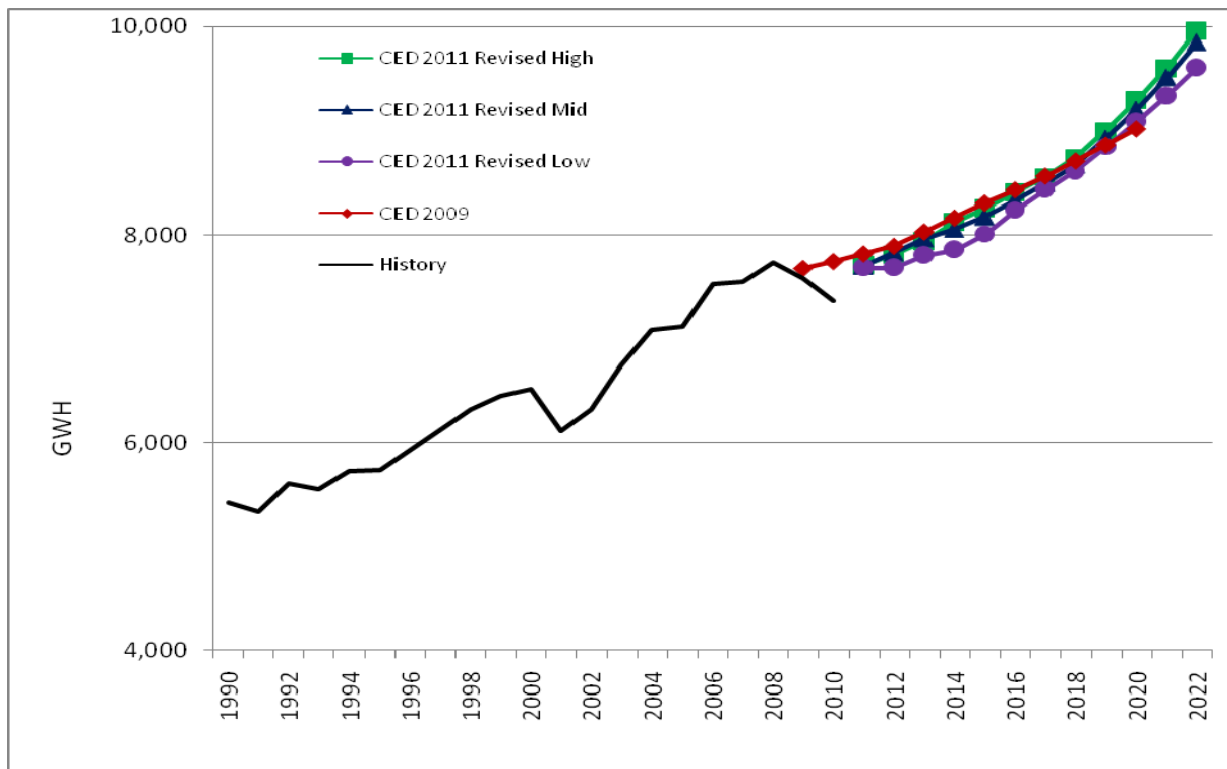
Source: California Energy Commission, 2012

Sector Level Results and Input Assumptions

Residential

Figure 3-6 compares the *CED 2011 Revised* and *CED 2009* planning area residential forecasts. Due to a lower starting point, all three scenarios project a lower level of consumption than *CED 2009* in the very near term. However, for each scenario, the overall growth rate is higher than *CED 2009* due to higher growth in occupied households and higher income growth in the mid and high demand scenarios. By 2020, all three scenarios are within 3 percent of the *CED 2009* forecast. This narrow range of forecasts reflects a relatively narrow spread in personal income between the scenarios. The mid case grows at an annual rate of 2.3 percent to reach 9,850 GWh by 2022.

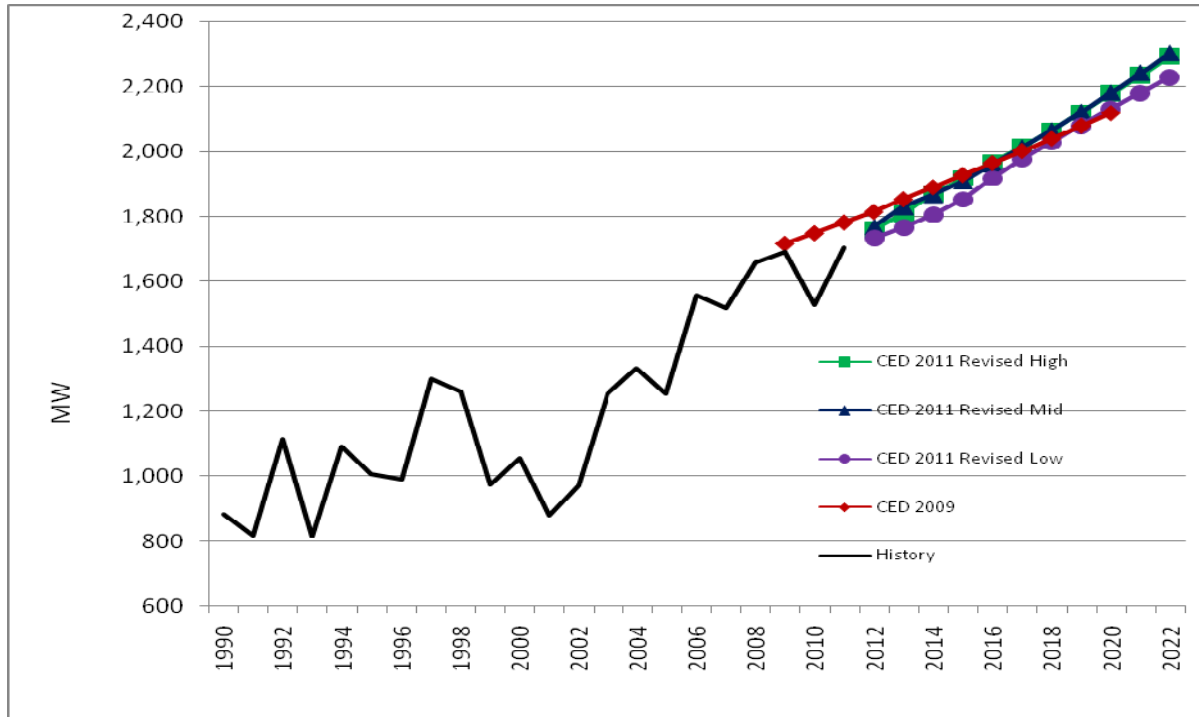
Figure 3-6: SDG&E Planning Area Residential Consumption



Source: California Energy Commission, 2012

Figure 3-7 compares the *CED 2011 Revised* and *CED 2009* residential peak demand forecasts. The *CED 2011 Revised* forecasts are all lower than the *CED 2009* forecast at the beginning of the forecast period but grow at a faster rate than *CED 2009* (driven by faster commercial floor space growth). The mid and high case scenarios have similar growth rates and reach nearly 2,300 MW by 2022.

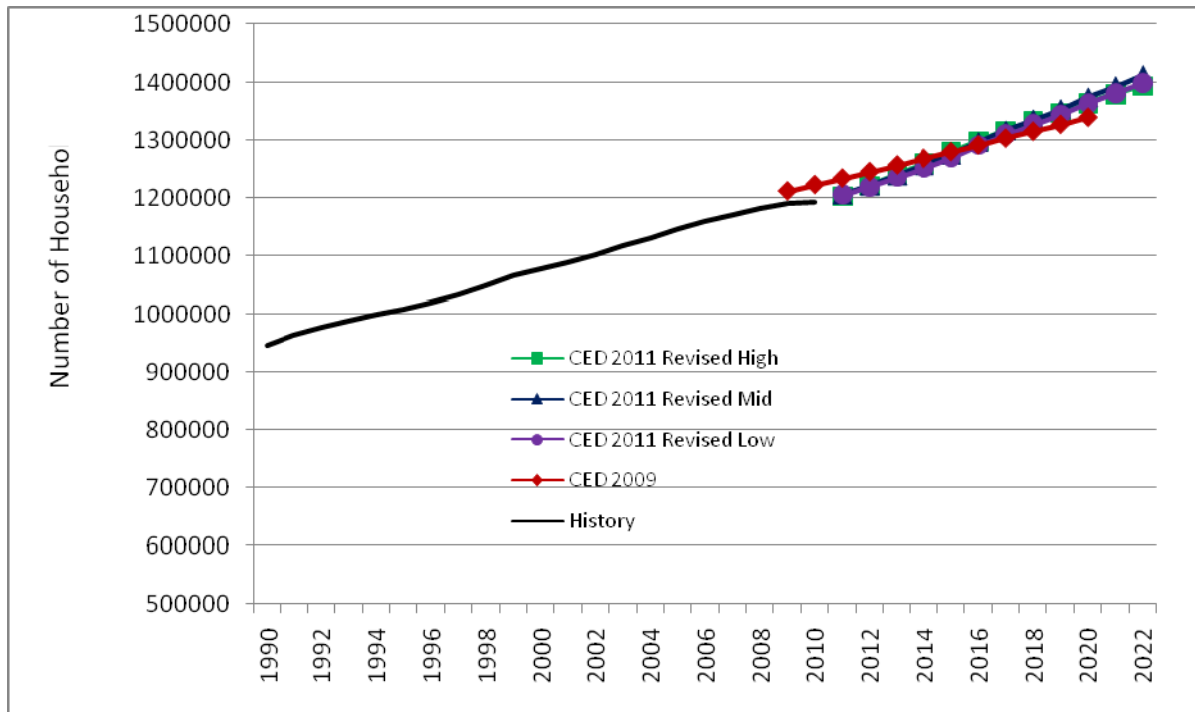
Figure 3-7: SDG&E Planning Area Residential Peak



Source: California Energy Commission, 2012

Figure 3-8, Figure 3-9, and Figure 3-10 compare the residential economic/demographic drivers used in *CED 2011 Revised* forecast with those used in *CED 2009*. **Figure 3-8** provides comparisons of total household projections. There is very little change in the year-to-year growth in the low, mid, and high demand scenarios. All three demand scenarios start lower than *CED 2009* but grow at a faster rate than *CED 2009*, such that all three scenarios are higher than *CED 2009* by the middle of the forecast horizon.

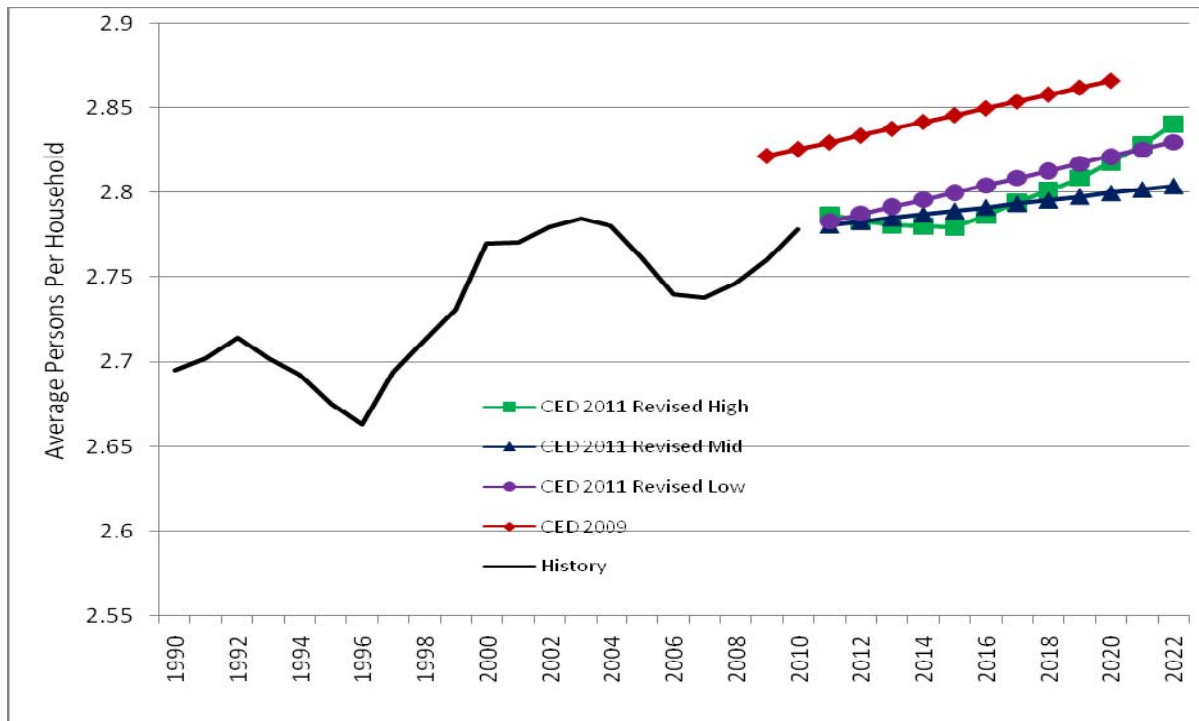
Figure 3-8: SDG&E Planning Area Household Projections



Source: California Energy Commission, 2012

Figure 3-9 compares persons per household. Population assumptions are consistent across all three scenarios, so the projections of households and persons per household are inversely related. The low and mid cases grow steadily while the high case declines in the near term before growing rapidly in the latter half of the forecast period. Due to a lower starting point, all three scenarios are lower than *CED 2009* throughout the forecast period.

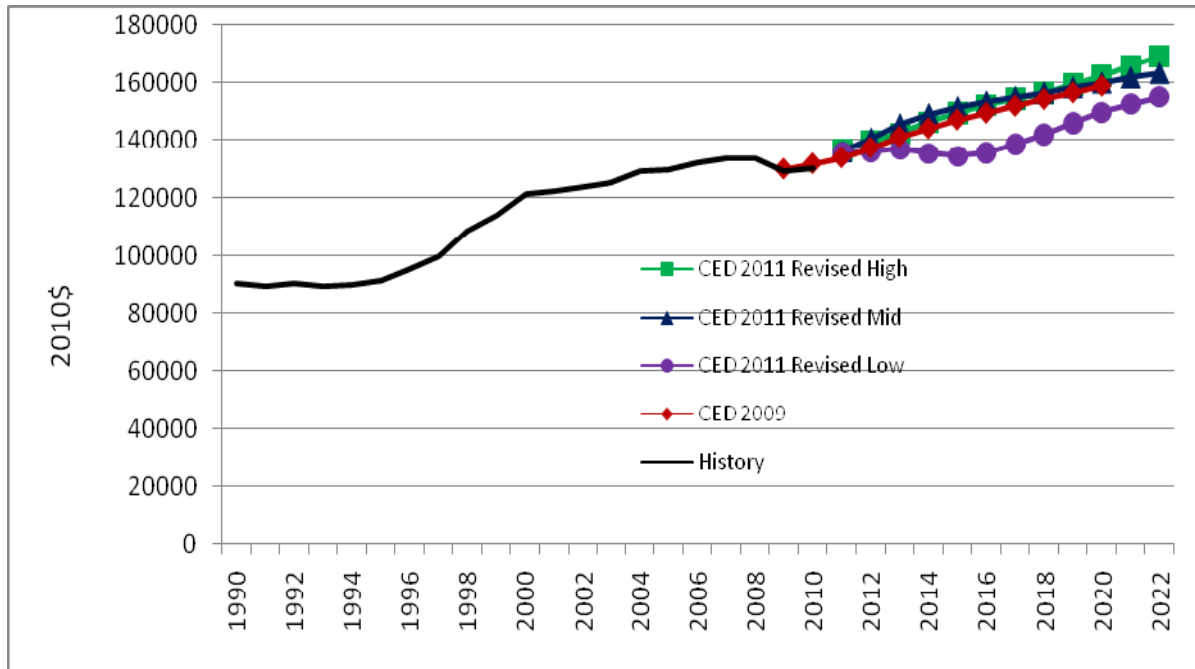
Figure 3-9: SDG&E Planning Area Persons per Household Projections



Source: California Energy Commission, 2012

Figure 3-10 provides a comparison of average household income between the forecasts and shows that the *CED 2011 Revised* mid demand case tracks very closely with the *CED 2009* projection. Compared to the mid scenario, the high demand case has lower total household income in the early years of the forecast. This, combined with differences in the projected growth rate of households versus total household income, yields lower income per household in the high case than in the mid case until the later years of the forecast period.

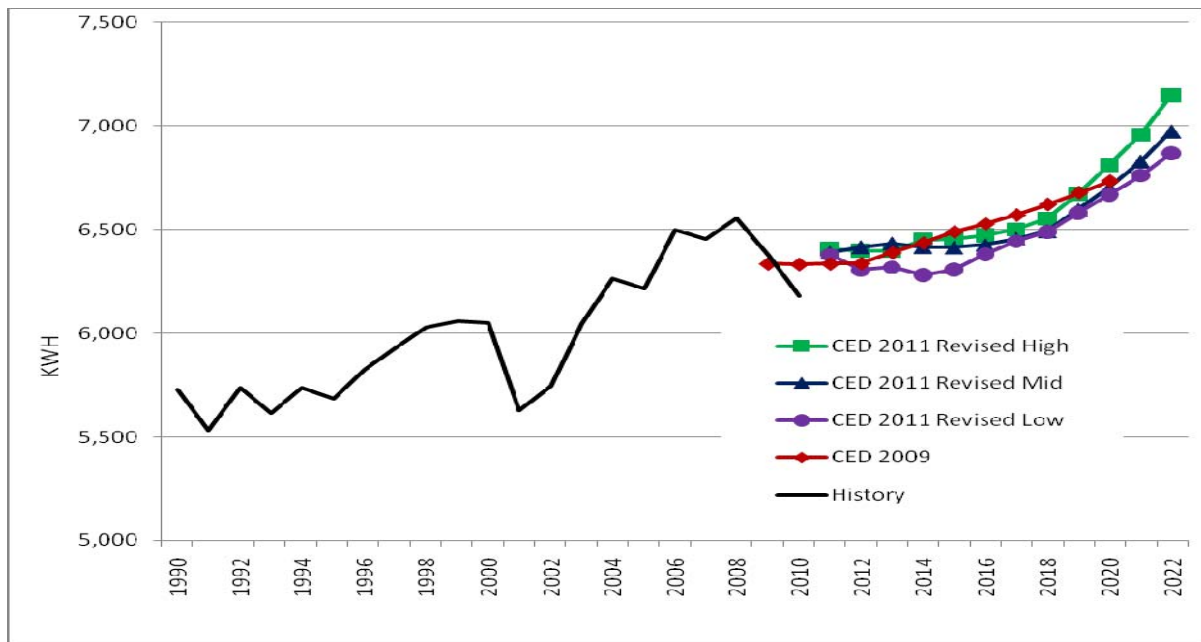
Figure 3-10: SDG&E Planning Area Average Household Income Projections



Source: California Energy Commission, 2012

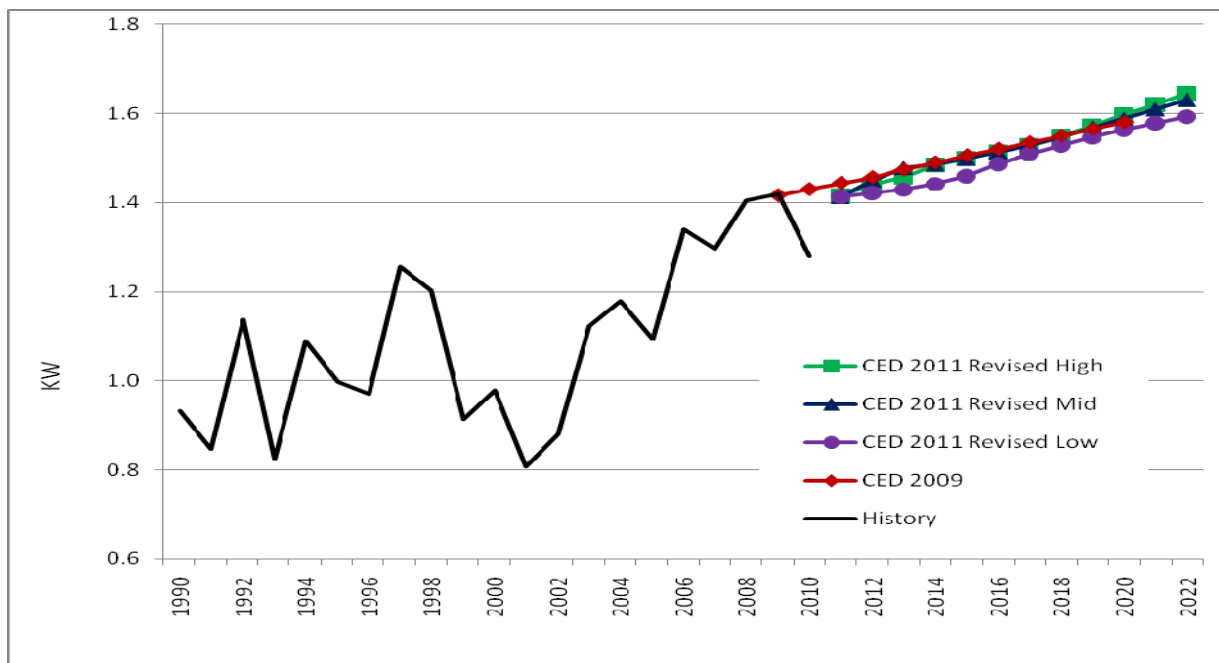
Figure 3-11 and **Figure 3-12** on the next page compare residential consumption per household and residential peak use per household, respectively. The *CED 2011 Revised* forecast of consumption per household for all three scenarios is initially higher than that projected in *CED 2009* but drops below *CED 2009* during the middle of the forecast. Towards the end of the forecast period, growth rates for all three of the revised forecasts are higher than *CED 2009* due to the impact of electric vehicles. The *CED 2011 Revised* forecast of peak use per household is lower than that projected in *CED 2009* due to a lower starting point.

Figure 3-11: SDG&E Planning Area Consumption per Household



Source: California Energy Commission, 2012

Figure 3-12: SDG&E Planning Area Peak Use per Household

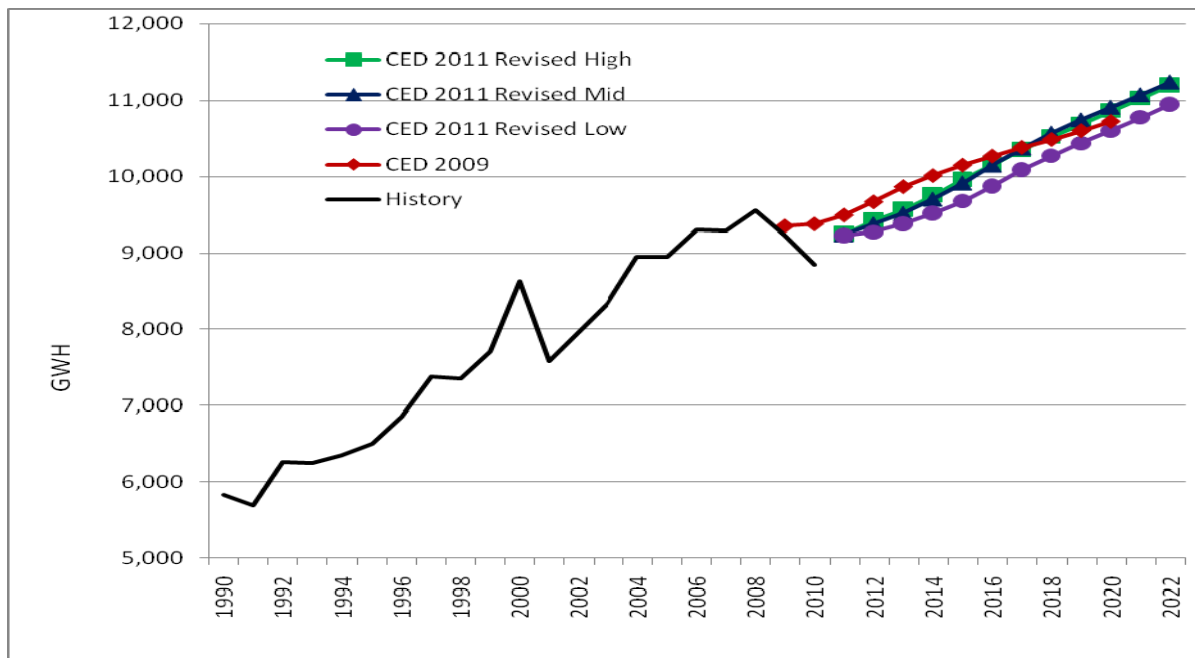


Source: California Energy Commission, 2012

Commercial Sector

Figure 3-13 compares the commercial sector consumption forecasts. Projected growth from 2011-2020 in commercial consumption is faster in all three scenarios compared to *CED 2009* because of faster projected growth in commercial floor space. Relatively similar projections of floor space among the scenarios (see Volume 1) lead to little difference among the scenarios. Since 2010 marked unusually cool weather in Southern California, the consumption scenarios began at a value lower than predicted by *CED 2009*. The mid case grows at an annual rate of 1.8 percent to reach 11,240 GWh by 2022.

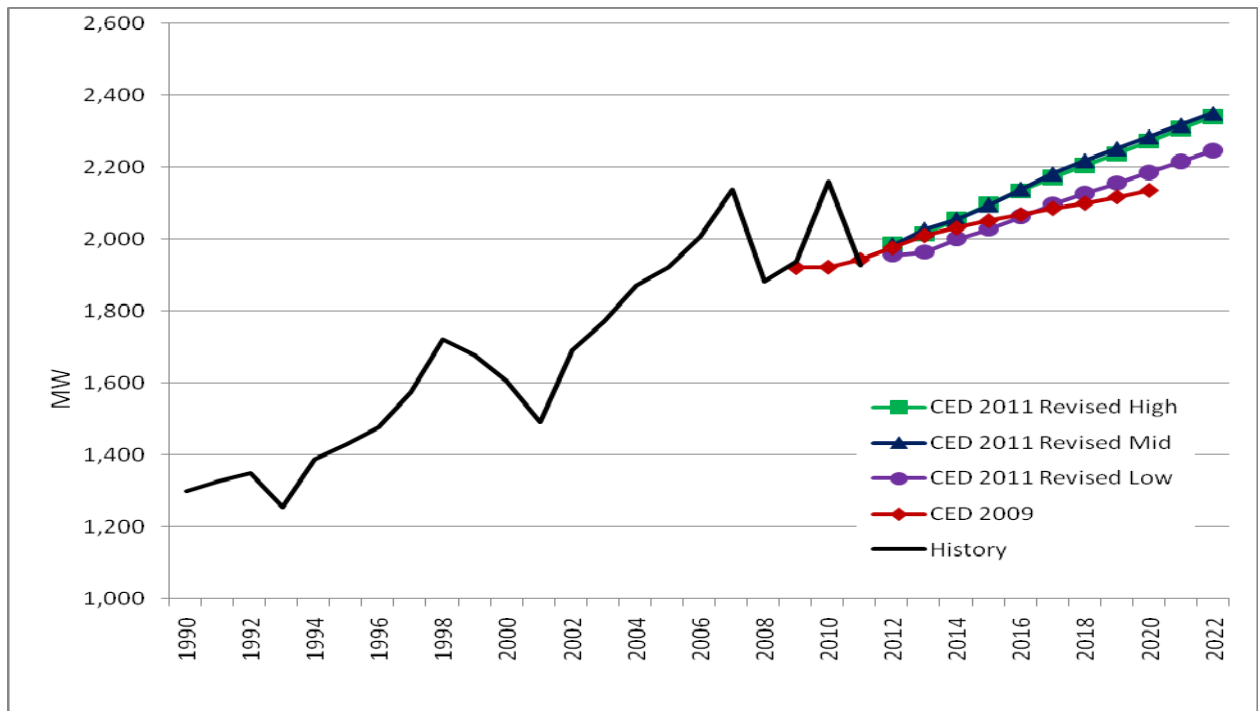
Figure 3-13: SDG&E Planning Area Commercial Consumption



Source: California Energy Commission, 2012

Figure 3-14 compares the commercial sector peak demand forecasts. Differences in the peak forecasts are similar to those in the consumption forecasts, with a higher relative (to *CED 2009*) growth rate in the mid and high cases due to the adjustment for climate change. The mid case grows at an annual rate of 1.7 percent to reach 2,350 MW by 2022.

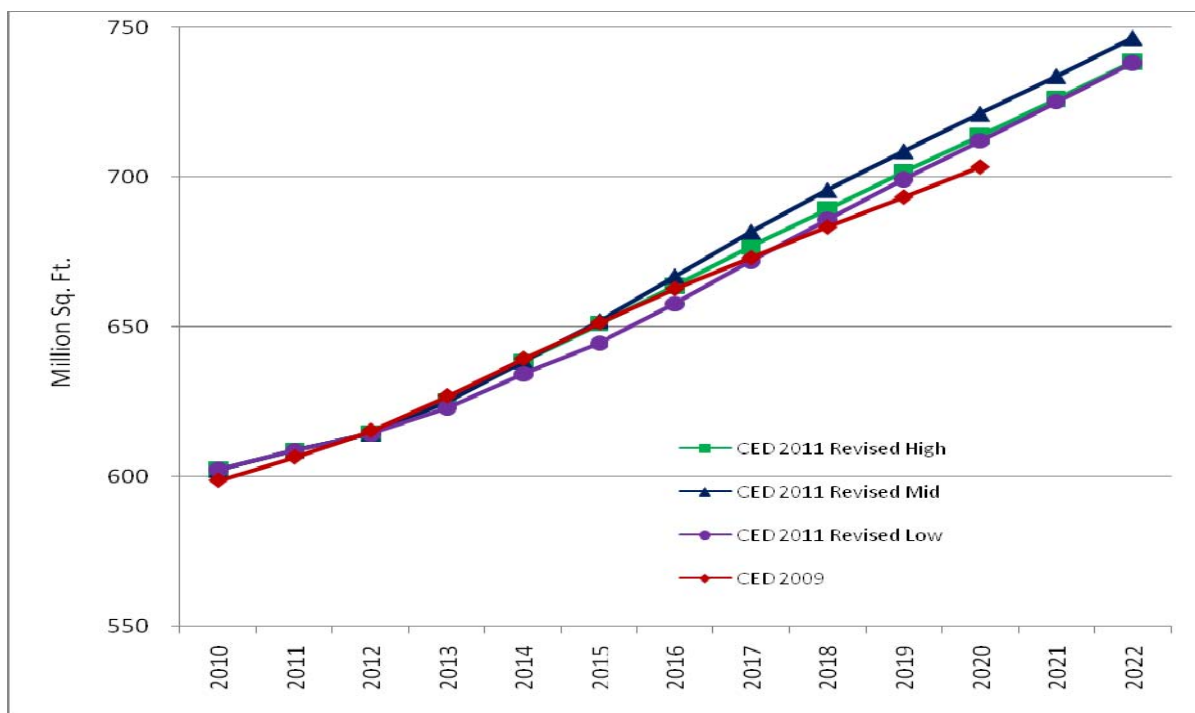
Figure 3-14: SDG&E Planning Area Commercial Sector Peak



Source: California Energy Commission, 2012

In staff's commercial building sector forecasting model, floor space by building type (for example, retail, schools, and offices) is the key driver of energy use for each specific building type. **Figure 3-15** compares total commercial floor space projections. Floor space projections are driven by employment forecasts in individual subsectors (retail, wholesale, restaurants, and so on). These may differ among the economic forecasts so that a subsector employment forecast may be higher in the low demand scenario than in the high case, even though total employment is lower. This can lead to the result shown in **Figure 3-15**, where mid demand floor space is higher than the high case projection. However, lower projected electricity rates and efficiency program impacts in the high demand case keep commercial consumption generally above that in the other two scenarios, as shown in **Figure 3-13**.

Figure 3-15: SDG&E Planning Area Commercial Floor Space

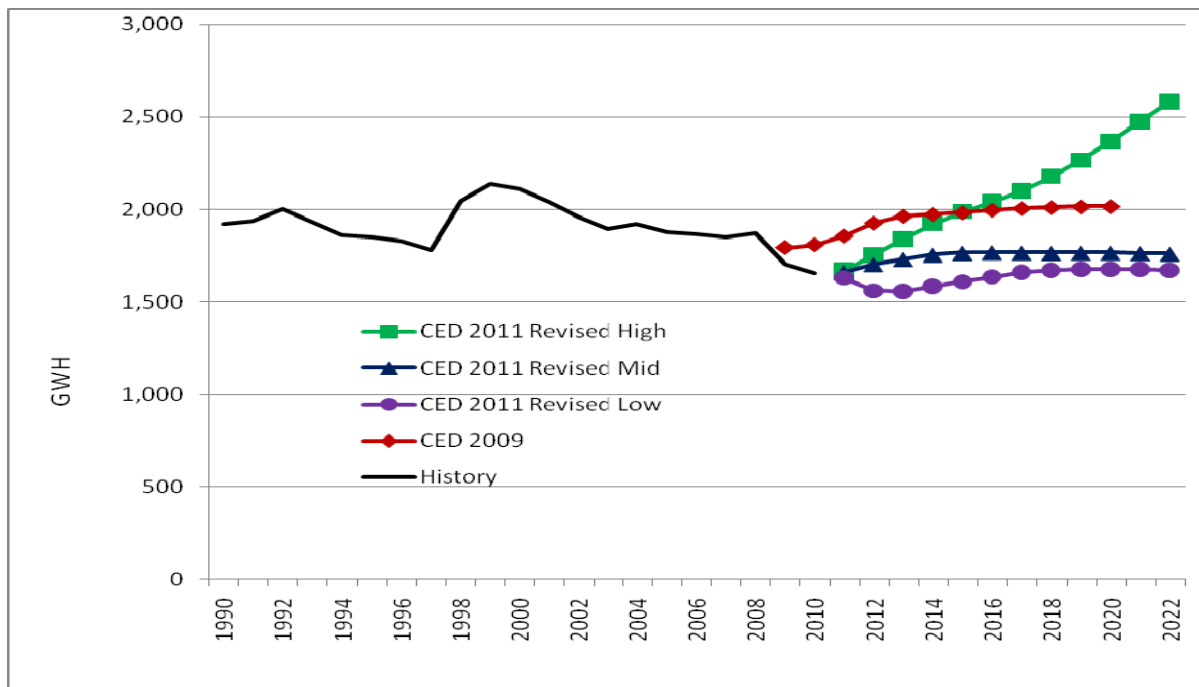


Source: California Energy Commission, 2012

Industrial Sector

Figure 3-16 compares the industrial sector electricity consumption forecasts for the SDG&E planning area. *CED 2011 Revised* mid and low cases echo a pattern described in *CED 2009*—short-term recovery followed by a return to long-term decline. The lower starting point for *CED 2011 Revised* follows from actual industrial consumption in 2010, which was lower than projected in *CED 2009*. The substantial spread between low and high cases (the high case is about 55 percent higher than the low case in 2022) reflects disparate input forecasts. Global Insight, which was used in the high case, projects very high growth in manufacturing and construction relative to Moody's, which was used in the mid and low cases.

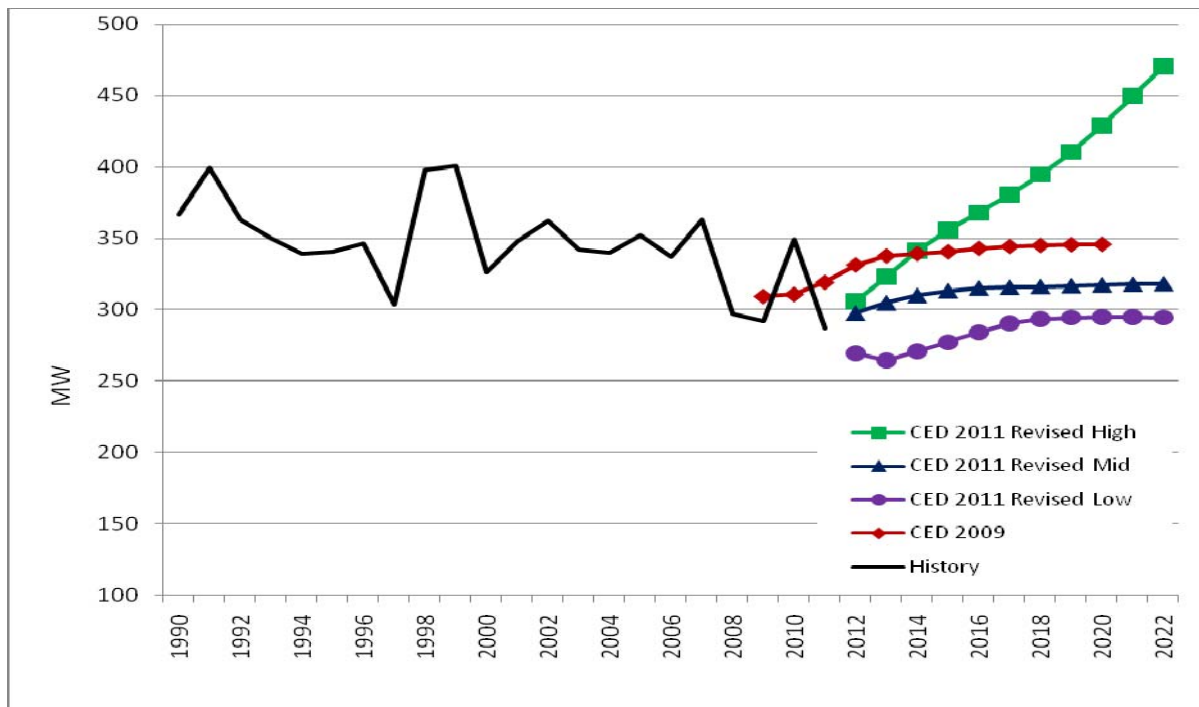
Figure 3-16: SDG&E Planning Area Industrial Consumption



Source: California Energy Commission, 2012

Figure 3-17 compares the industrial sector peak forecasts. Differences in the peak forecasts are similar to those of the consumption forecasts.

Figure 3-17: SDG&E Planning Area Industrial Sector Peak



Source: California Energy Commission, 2012

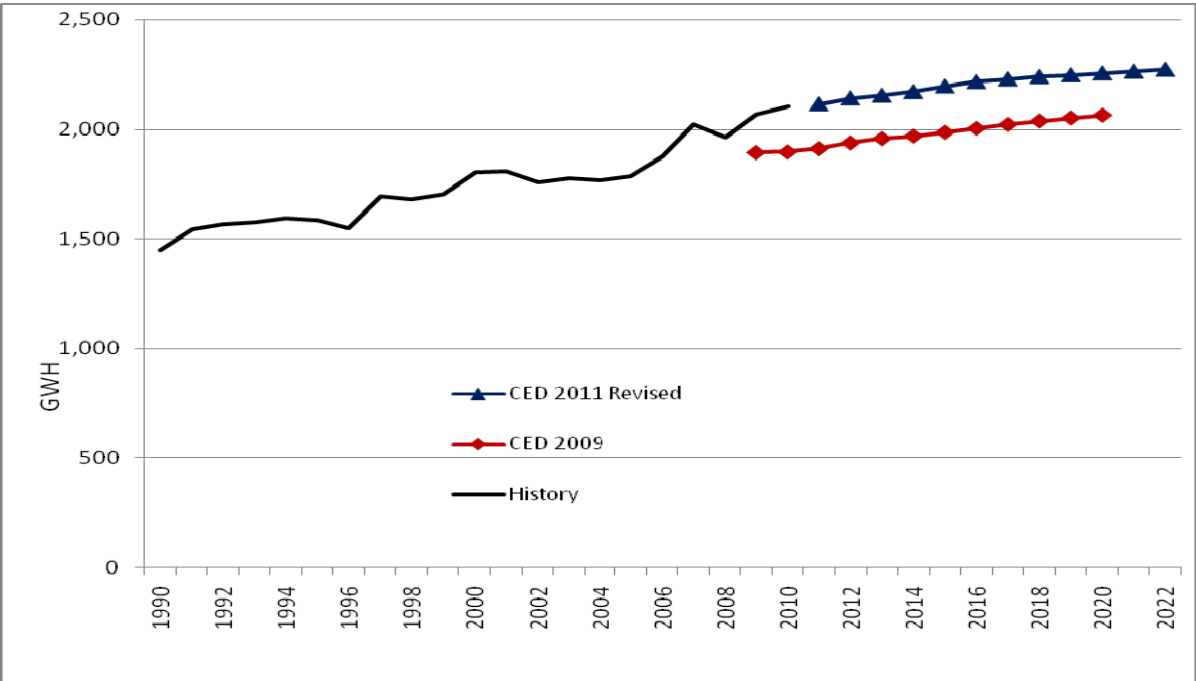
Other Sectors

Figure 3-18 and **Figure 3-19** shown on the next page compares the remaining sector electricity consumption forecasts. **Figure 3-18** provides a comparison of the transportation, communication, and utilities (TCU) sector forecast, which includes street lighting. In this case, a single scenario was run.³ The *CED 2011 Revised* forecast is higher than the *CED 2009* forecast because of a higher historical starting point. The revised forecast has a lower annual growth rate, however, at 0.66 percent.

Figure 3-19 compares the agriculture and water pumping sector forecasts. The *CED 2011 Revised* agriculture and water-pumping forecast does not deviate significantly from *CED 2009*, though it does have a slightly higher annual growth rate at 0.96 percent in the mid case. The slight differences between demand scenarios reflect different forecasts of occupied households.

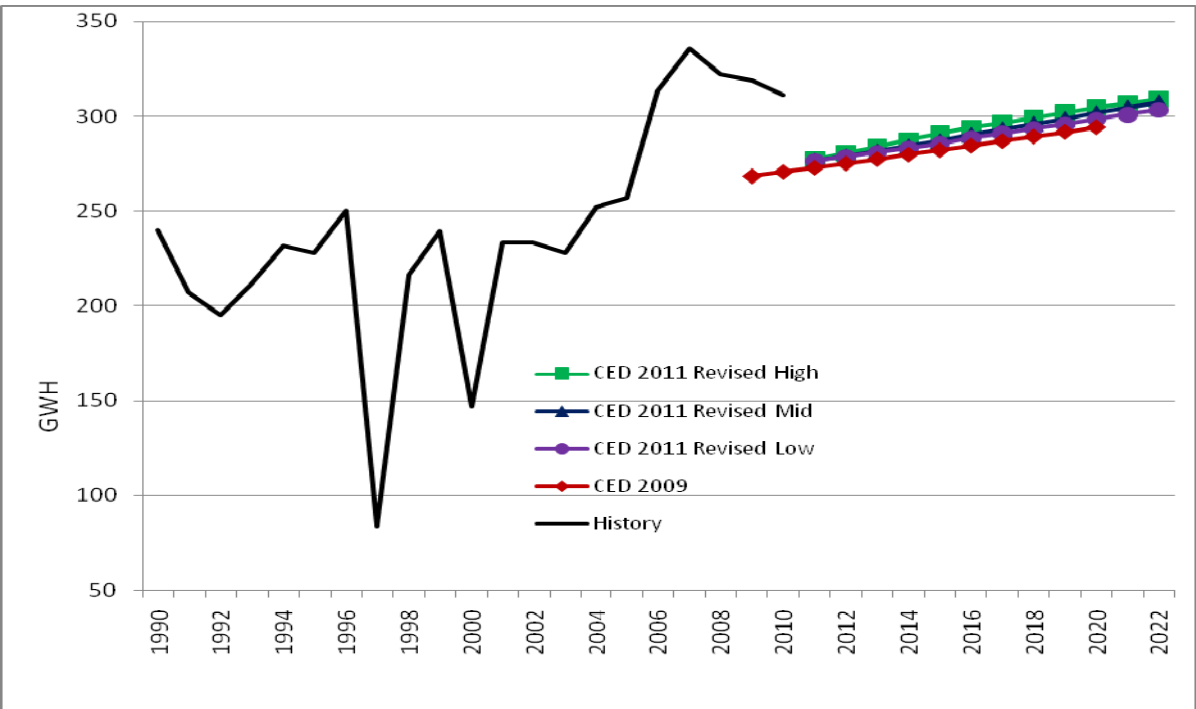
³ Growth in transportation, communication, and utilities (TCU) consumption depends mainly on population, for which there is only one scenario.

Figure 3-18: SDG&E Planning Area Transportation, Communication, and Utilities Sector Electricity Consumption



Source: California Energy Commission, 2012

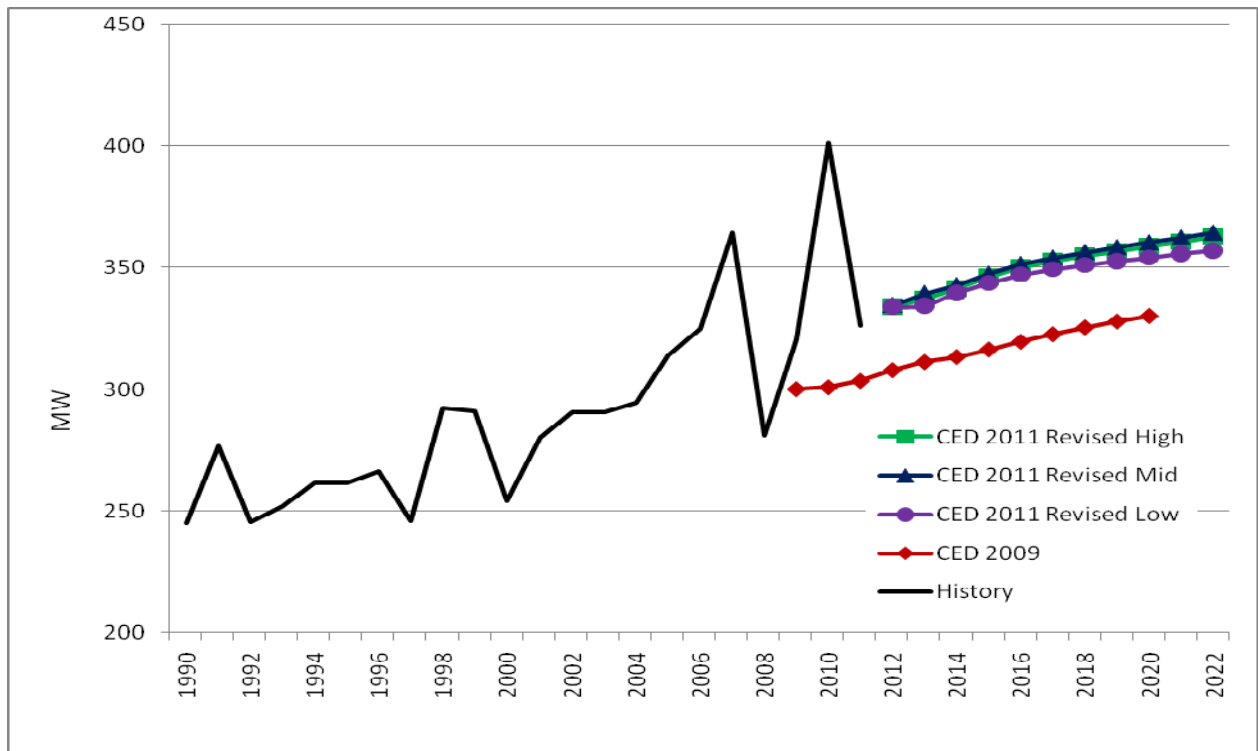
Figure 3-19: SDG&E Planning Area Agriculture & Water Pumping Forecasts



Source: California Energy Commission, 2012

Figure 3-20 compares the combined “other” sector peak forecasts. This sector includes the combined demands of the transportation, communication, utility, street lighting, agricultural, and water pumping sectors. The *CED 2011 Revised* forecast grows at a rate of 0.83 percent annually, roughly the same growth projected by *CED 2009*. Because of the significantly higher starting point, the forecast scenarios remain higher throughout the forecast period.

Figure 3-20: SDG&E Planning Area Other Sector Peak



Source: California Energy Commission, 2012

Electric Vehicles

Figure 3-21 presents the SDG&E planning area electric vehicle consumption forecast for each of the demand scenarios. Electricity consumption by electric vehicles is expected to increase from 2 GWh in 2011 to around 250 GWh in the low demand scenarios and to more than 500 GWh in the high case by 2022. Staff assumed most recharging would occur during off-peak hours, so peak impacts are expected to be relatively small, causing an increase of 11 MW in the low demand case and 22 MW in the high scenario by the end of the forecast period.

Figure 3-21: SDG&E Planning Area Electric Vehicle Forecast



Source: California Energy Commission, 2012

Self-Generation

The peak demand forecast is reduced by self-generation, including the effects of SGIP, CSI, and other programs, as discussed in Volume 1. The effects of these programs are forecast based on recent trends in installations and a residential predictive model. **Table 3-2** shows *CED 2011 Revised* forecasts of peak impacts from photovoltaic (PV) and non-PV self-generation. Only residential PV impacts varied in the demand scenarios, based on differences in households and energy rates. Staff projects about 186 MW of peak reduction from PV installation in the mid case by 2022. Peak reductions are based on installed PV system capacities of 260 MW by 2022 in the high demand case and 328 MW by 2022 in the low demand case.

Table 3-22: SDG&E Planning Area Self-Generation Peak Forecasts (MW)

Year	1990	2000	2010	2015	2020	2022
Non-PV Self-Generation	78.68	59.47	115.26	134.56	134.56	134.56
PV, Low Demand	0.00	0.05	46.86	123.83	175.68	214.40
PV, Mid Demand	0.00	0.05	46.86	115.66	153.39	185.80
PV, High Demand	0.00	0.05	46.86	113.32	142.80	168.37
Total Self-Generation, Low Demand	78.68	59.53	162.11	258.39	310.25	348.96
Total Self-Generation, Mid Demand	78.68	59.53	162.11	250.22	287.95	320.37
Total Self-Generation, High Demand	78.68	59.53	162.11	247.89	277.36	302.93

Source: California Energy Commission, 2012

Conservation/Efficiency Impacts

Table 3-3 shows electricity consumption and peak savings estimates for building and appliance standards for the mid demand scenario for selected years. Total standards impacts are higher in the high demand case by 1.5-2.0 percent due to higher home construction and 1.5-2.0 percent lower in the low demand case. The standards savings estimates include the 2010 revision to Title 24 building standards as well as AB 1109 lighting savings and television standard savings. Savings are measured against a baseline before 1975, so they incorporate more than 30 years of impacts. Volume 1 provides more detail on staff work related to energy efficiency and conservation.

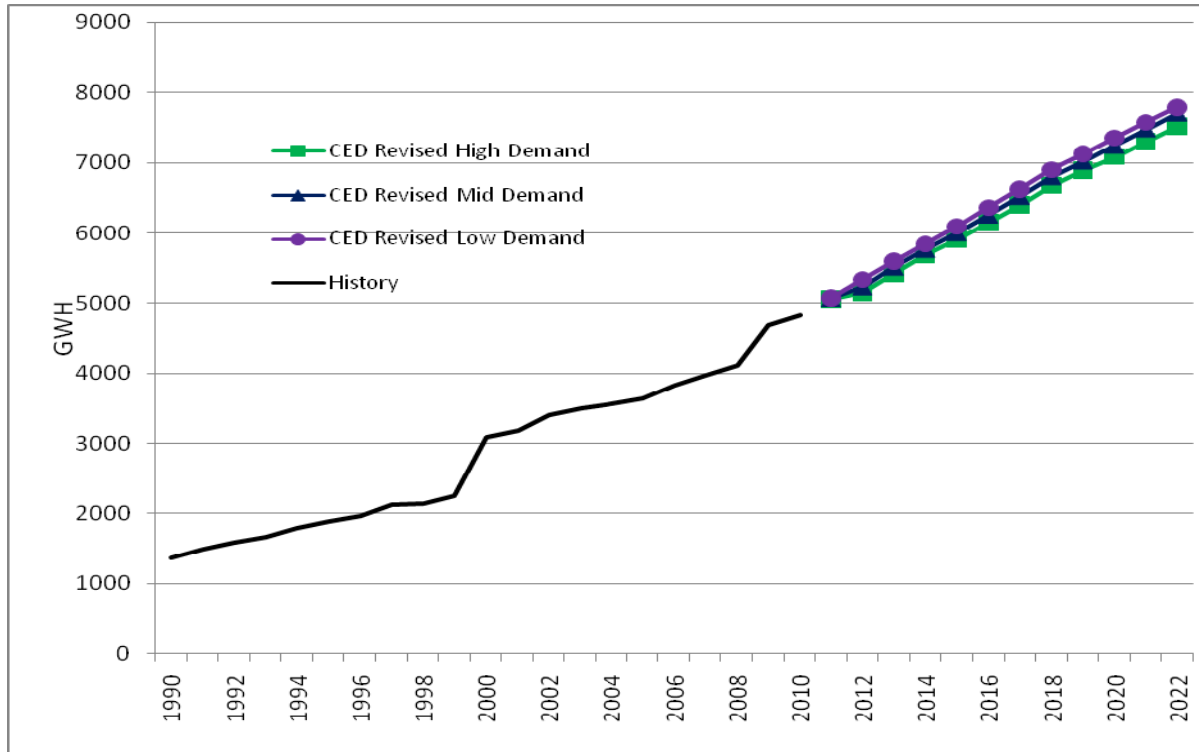
Table 3-3: SDG&E Planning Area Electricity Savings Estimates From Standards, Mid Demand Scenario

Electricity Consumption Savings (GWh)							
	Residential			Commercial			
	Building Standards	Appliance Standards	Total	Building Standards	Appliance Standards	Total	Total Standards
1990	401	197	598	151	97	247	845
2000	443	616	1059	406	260	666	1725
2010	286	1351	1637	789	457	1,245	2882
2015	376	1949	2325	1,032	594	1626	3951
2020	474	2460	2933	1347	796	2144	5077
2022	503	2574	3076	1464	838	2302	5378
Electricity Peak Demand Savings (MW)							
	Residential			Commercial			
	Building Standards	Appliance Standards	Total	Building Standards	Appliance Standards	Total	Total Standards
1990	65	32	97	34	22	55	153
2000	72	100	171	76	48	124	295
2010	59	280	339	193	112	304	643
2015	88	455	543	218	126	344	886
2020	112	583	695	282	167	449	1144
2022	118	602	719	306	175	482	1201

Source: California Energy Commission, 2012

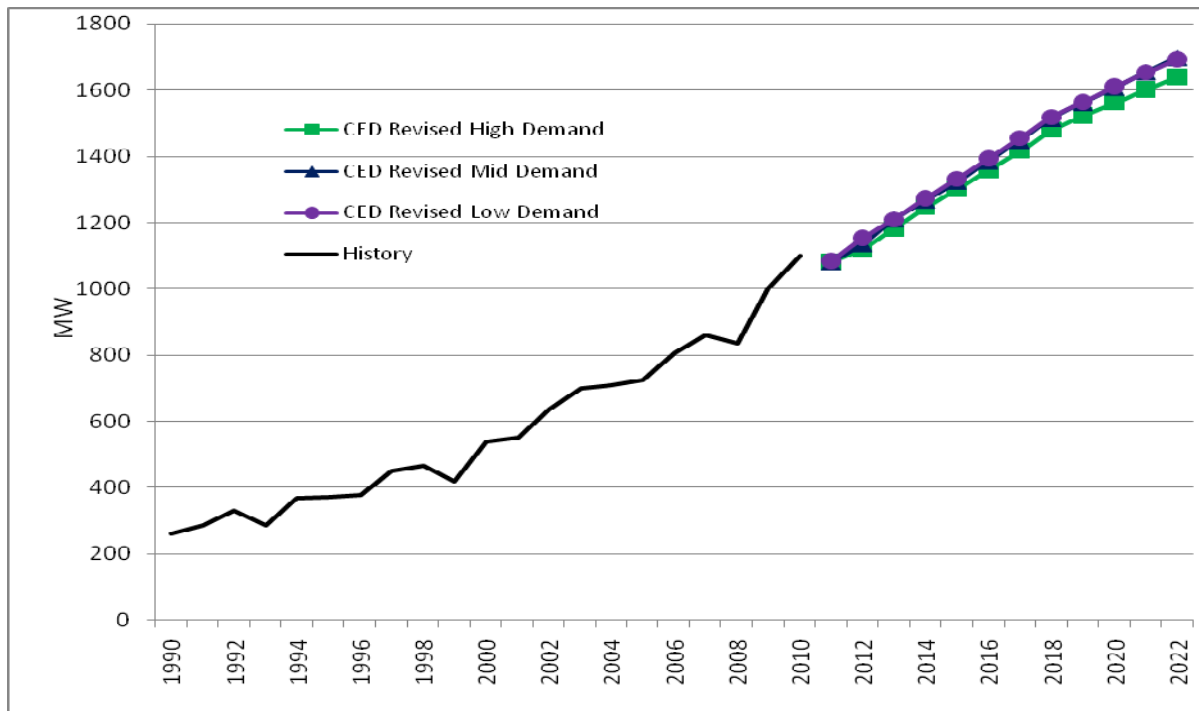
Figure 3-22 and **Figure 3-23** depicted on the next page show forecasts of total savings impacts on electricity and peak demand, respectively, from committed sources, including building and appliance standards; utility and public agency programs offered prior to 2013; and price and other effects, or savings associated with rate changes and certain market trends not directly related to programs or standards. Projected savings impacts are higher the lower the demand scenario, since price and program effects are inversely related to the demand outcome.

Figure 3-22: SDG&E Planning Area Electricity Consumption Savings Estimates



Source: California Energy Commission, 2012

Figure 3-23: SDG&E Planning Area Electricity Peak Savings Estimates



Source: California Energy Commission, 2012

CHAPTER 4: Sacramento Municipal Utility District Planning Area

The SMUD planning area includes SMUD retail customers but does not include the new members of the SMUD control area, Roseville, Redding, and the WAPA. To support electricity system analysis, staff derives forecasts by control area and California ISO congestion zone from the planning area forecasts. Using historical consumption data and regional population projections, the estimated share of the PG&E forecast for WAPA, Roseville, and Redding forecasts are subtracted from the PG&E planning area and added to the SMUD control area. The results in this chapter are for the SMUD planning area only.

This chapter is organized as follows. First, forecasted consumption and peak loads for the SMUD planning area are discussed; both total and per capita values are presented. The *CED 2011 Revised* values are compared to the *CED 2009* forecast; and differences between the two forecasts are explained. The forecasted load factor, jointly determined by the consumption and peak load estimates, is also discussed. Second, sector consumption and peak load forecasts are presented. The residential, commercial, industrial, and “other” sector staff draft forecasts are compared to those in *CED 2009*; again, differences between the two are discussed.

For the *CED 2011 Revised* forecast, three scenarios of electricity use were developed for analysis, which include a low, mid and high electricity demand forecast. Volume 1 provides an explanation of the methodology and assumptions used in the scenarios.

Forecast Results

Table 4-1 compares *CED 2011 Revised* projected electricity consumption and peak demand for selected years for the three demand scenarios and the *CED 2009* forecast.

Table 4-1: SMUD Planning Area Forecast Comparison

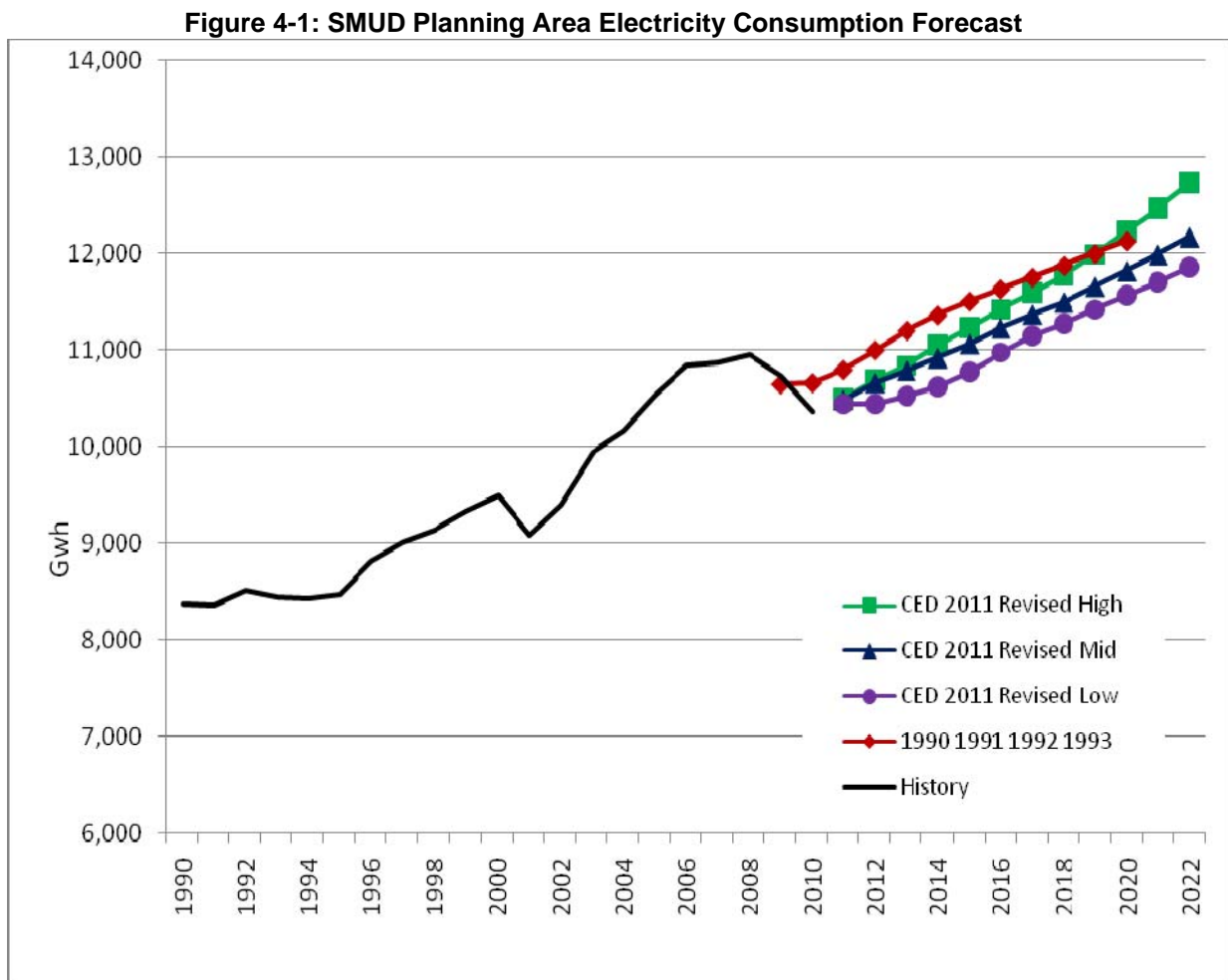
Consumption (GWh)				
	<i>CED 2009</i> (Dec. 2009)	<i>CED 2011</i> Revised-High	<i>CED 2011</i> Revised-Mid	<i>CED 2011</i> Revised-Low
1990	8,358	8,361	8,361	8,361
2000	9,494	9,498	9,498	9,498
2010	10,656	10,354	10,354	10,354
2011	10,793	10,501	10,483	10,445
2015	11,504	11,239	11,066	10,778
2020	12,131	12,228	11,822	11,567
2022	--	12,730	12,173	11,859
Average Annual Growth Rates				
1990-2000	1.28%	1.28%	1.28%	1.28%
2000-2010	1.16%	0.87%	0.87%	0.87%
2011-2015	1.61%	1.71%	1.36%	0.79%
2011-2020	1.31%	1.71%	1.34%	1.11%
2011-2022	--	1.74%	1.36%	1.14%
Peak (MW)				
	<i>CED 2009</i> (Dec. 2009)	<i>CED 2011</i> Revised-High	<i>CED 2011</i> Revised-Mid	<i>CED 2011</i> Revised-Low
1990	2,167	2,193	2,193	2,193
2000	2,687	2,686	2,686	2,686
2011	3,088	2,840	2,840	2,840
2011*	3,088	3,024	3,024	3,024
2015	3,270	3,305	3,248	3,091
2020	3,438	3,591	3,465	3,304
2022	--	3,705	3,541	3,354
Average Annual Growth Rates				
1990 - 2000	2.17%	2.05%	2.05%	2.05%
2000 - 2011	1.27%	0.51%	0.51%	0.51%
2011* - 2015	1.44%	2.24%	1.80%	0.55%
2011* - 2020	1.20%	1.93%	1.52%	0.99%
2011* - 2022	--	1.87%	1.45%	0.95%
Historical values are shaded				
* <i>CED 2011 Revised</i> uses a weather-normalized peak value derived from the actual 2011 peak				

Source: California Energy Commission, 2012

Figure 4-1 below and **Figure 4-2** shown on the next page present a graphical comparison of the forecast with the *CED 2009* forecast for the SMUD planning area for both electricity consumption and peak demand, respectively.

For both consumption and peak demand, growth rates starting in 2011 are shown to enable comparisons for weather-normalized growth, since consumption in 2010 was reduced significantly due to a very mild weather year overall.

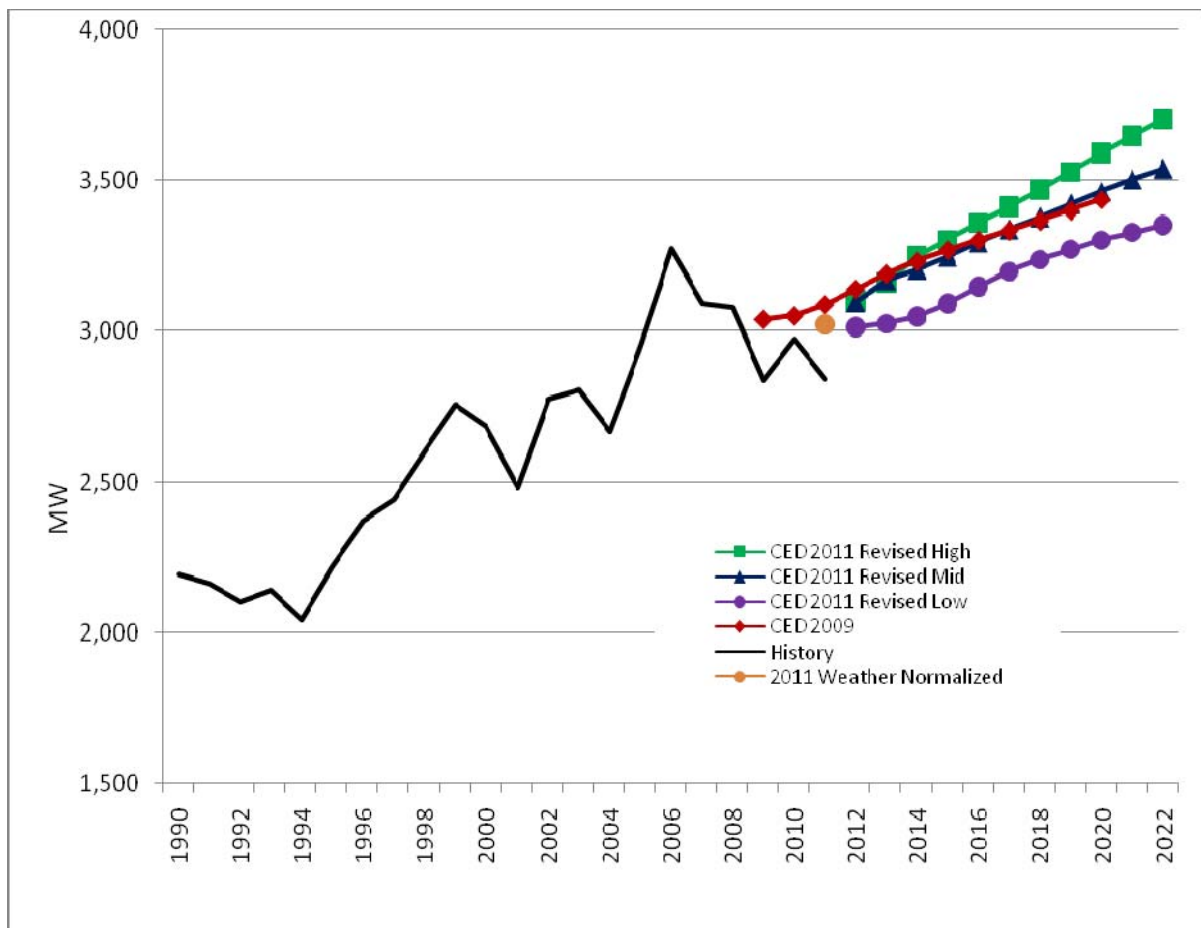
Average annual SMUD electricity use grows at a rate of 1.34 percent from 2011-2020 in the mid case of the *CED 2011 Revised* forecast compared to 1.31 percent in the *CED 2009* forecast. Total historical electricity consumption dropped 5.5 percent between 2008 and 2010. For the mid case, the *CED 2011 Preliminary* forecast is 3.8 percent lower than the *CED 2009* forecast in 2015. By 2020, this difference shrinks to 2.6 percent. Electricity consumption for the high case scenario eventually catches up to the *CED 2009* forecast at the end of the forecast period.



Source: California Energy Commission, 2012

The *CED 2011 Revised* SMUD planning area peak demand forecast for the low case scenario, shown in **Figure 4-2**, is lower through 2020 compared to the *CED 2009* forecast. The mid case, however, is very similar to what was predicted in *CED 2009*. By 2014, the high use scenario is higher than *CED 2009* and by 2020 reaches a difference of 4.5 percent. From 2011 through 2020, peak electricity demand grows at a rate of 1.93 percent for the new forecast compared to 1.20 percent in *CED 2009*. Historical peak demand dropped 135 MW from 2010 to 2011 as the SMUD service area experienced a mild summer. Staff calculated a weather normalized peak of 3,024 MW for 2011.

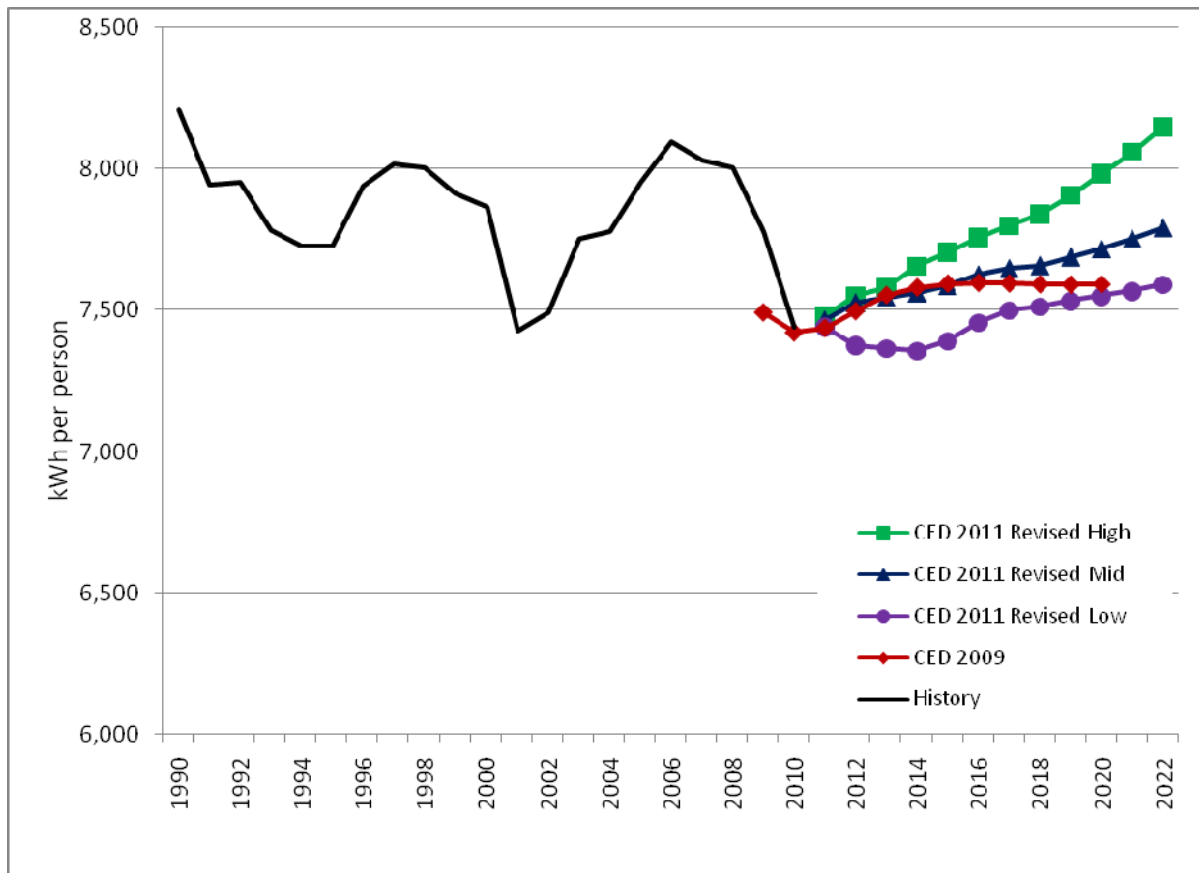
Figure 4-2: SMUD Planning Area Peak



Source: California Energy Commission, 2012

Figure 4-3 compares *CED 2011 Revised* and *CED 2009* per capita electricity consumption forecasts. The historical trend from 1990 through 2010 has been decreasing so that by 2010 per capita consumption dipped below historical lows of 7,500 kWh per person. Both the *CED 2011 Revised* and *CED 2009* forecasts are similar through 2015, but begin to separate as the mid case continues to grow while the *CED 2009* forecast flattens out during the second half of the forecast horizon. The per capita consumption growth rate accelerates towards the end of the forecast period for all three scenarios due to increasing numbers of electric vehicles. In 2015, projected per capita consumption in the mid case is around 7,588 kWh per person compared to 7,594 kWh per person in *CED 2009*. However, by 2020, per capita consumption in the mid case scenario becomes 1.7 percent higher than projected in *CED 2009*. The high case scenario surpasses the historical high and reaches 8,148 kWh per person by 2022.

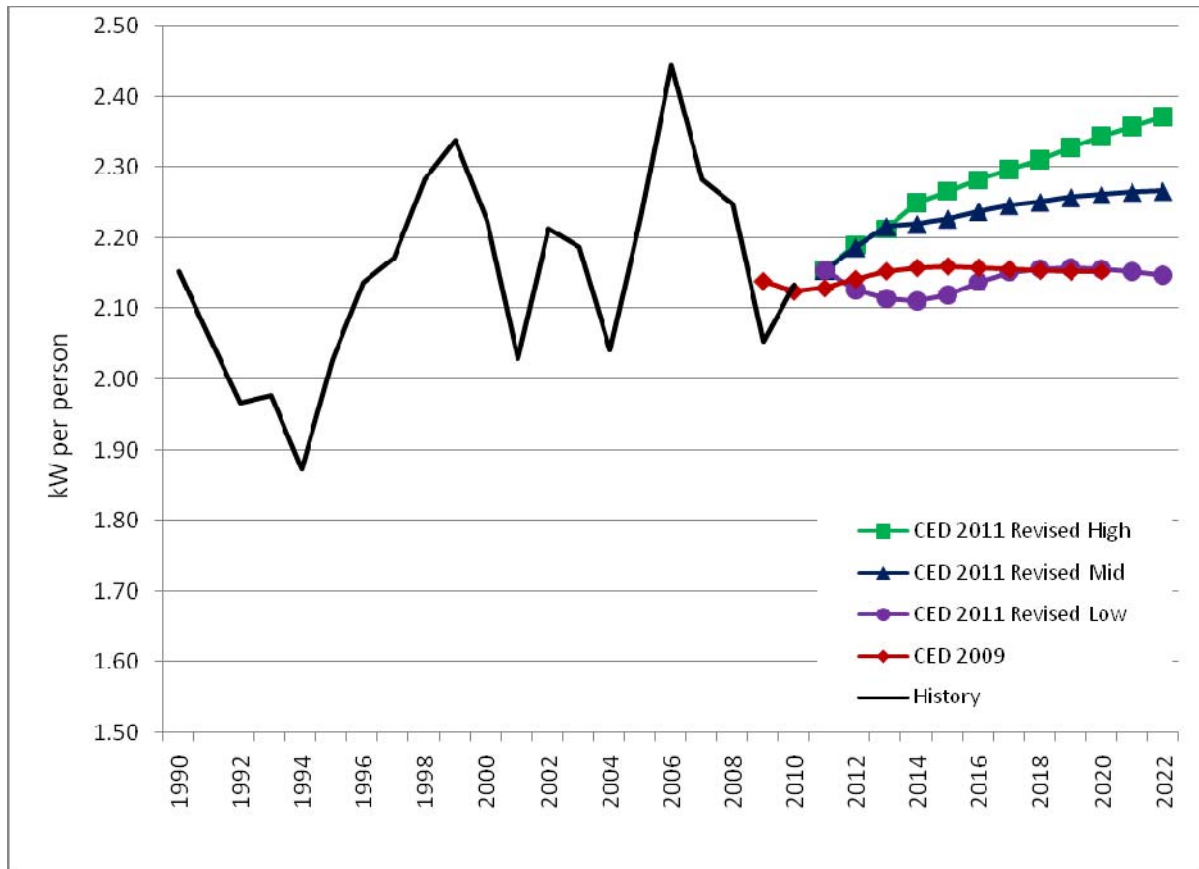
Figure 4-3: SMUD Planning Area per Capita Electricity Consumption



Source: California Energy Commission, 2012

Per capita peak demand is shown in **Figure 4-4**. The *CED 2009* forecast level was in line with the mid-range values experienced historically. However, since peaking in 2008, per capita peak demand has declined. *CED 2011 Revised* per capita peak demand is not expected to recover to *CED 2009* levels for the low and mid scenarios but is expected to reach nearly 2.37 kW by 2022.

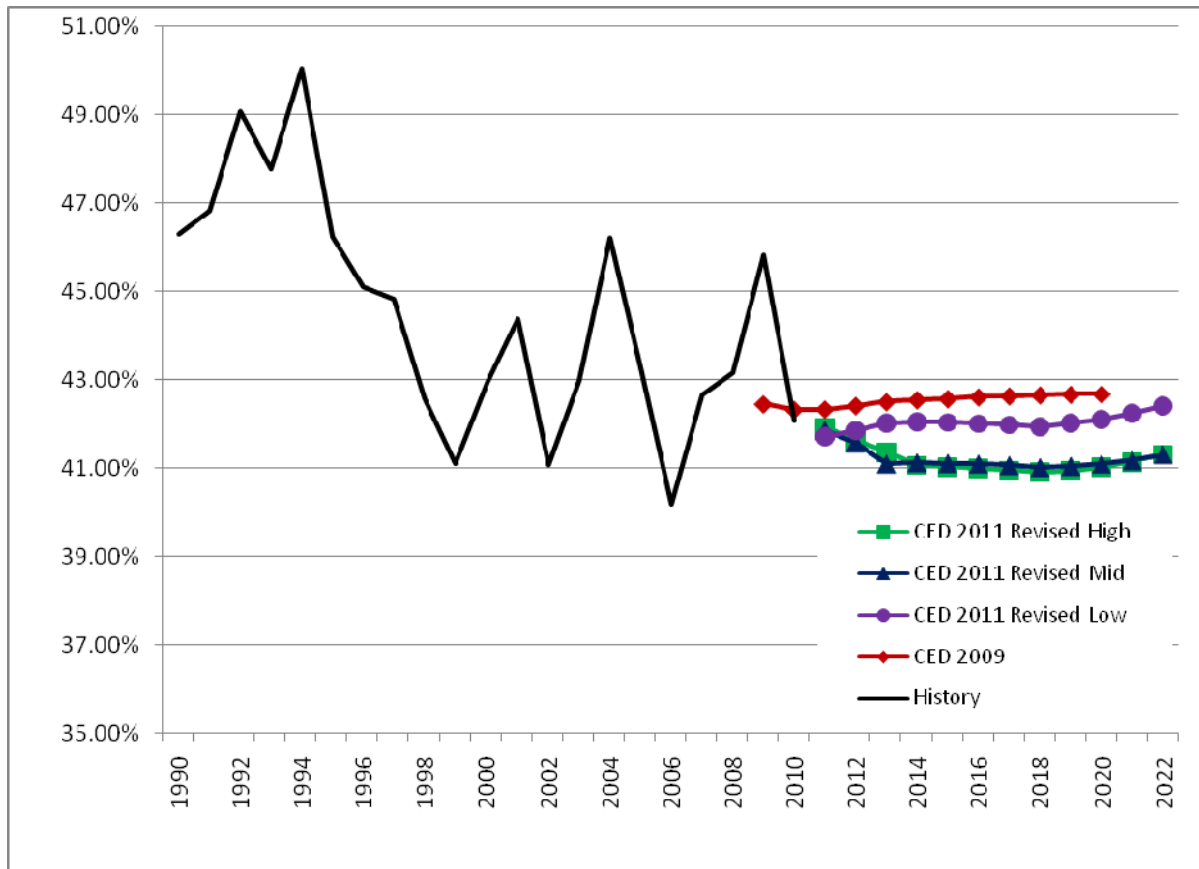
Figure 4-4: SMUD Planning Area per Capita Peak Demand



Source: California Energy Commission, 2012

Figure 4-5 compares *CED 2011 Revised* and *CED 2009* load factors. The load factor represents the relationship between average energy demand and system peak. The smaller the load factor, the greater is the difference between peak and average hourly demand. Variation in historical load factors is caused in part by annual weather patterns. In years with extreme heat, demand peaks at higher levels and results in lower system load factors. Higher load factors indicate demand is more stable. The SMUD load factor has been declining since the mid-1990s, as the residential sector—with a continually increasing presence of air conditioning—grew faster than other sectors. The forecasted load factors are fairly level as air conditioning in the SMUD planning area nears full saturation. The load factor in all three scenarios has dropped relative to *CED 2009* in part due to a lower electric vehicle forecast, which is assumed to affect consumption much more than peak. The annual growth rate for all three scenarios varies less than 0.22 percent and is -0.15 percent per year for the mid case.

Figure 4-5: SMUD Planning Area Load Factors



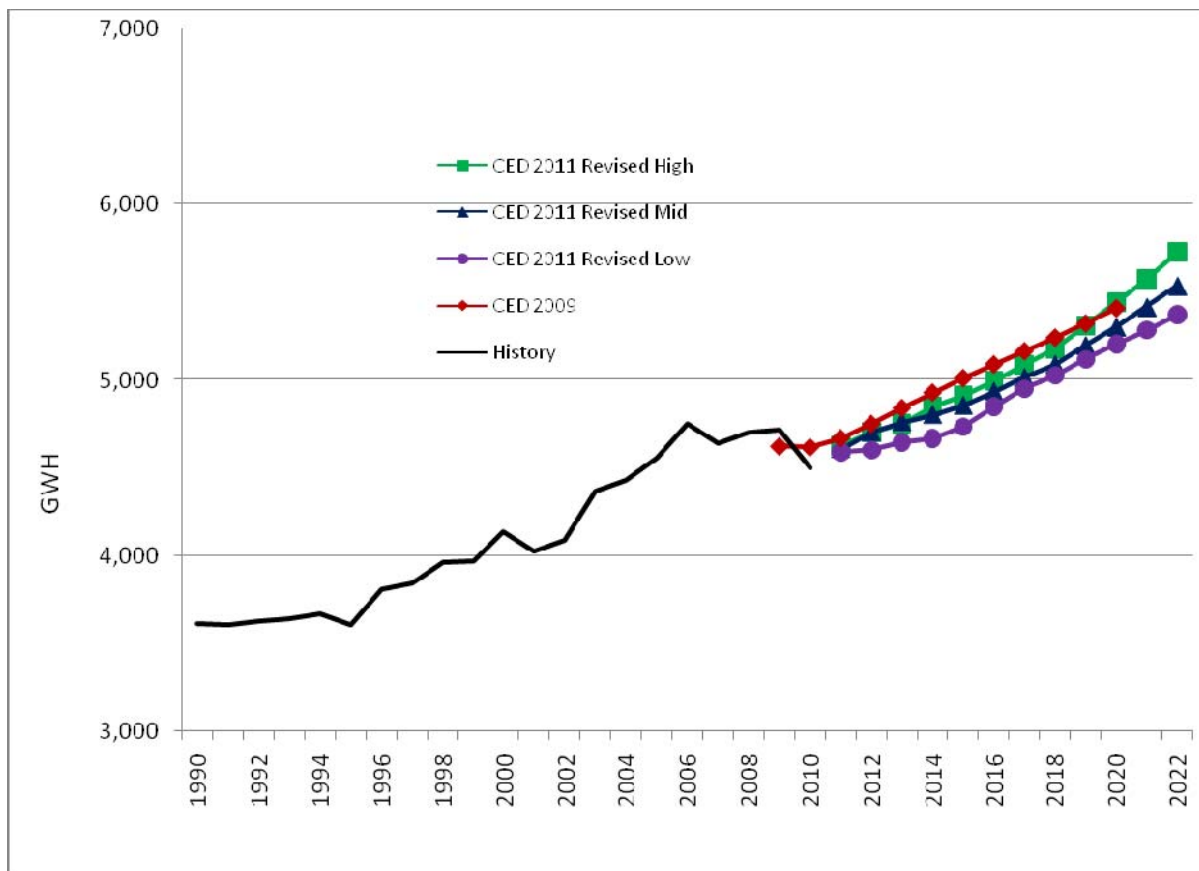
Source: California Energy Commission, 2012

Sector Level Results and Input Assumptions

Residential

Figure 4-6 compares *CED 2011 Revised* and *CED 2009* SMUD residential forecasts. The growth rate for residential consumption over the entire forecast period is higher in all three scenarios compared to *CED 2009* because of higher income growth used in the new forecast and an increase in the penetration of electric vehicles. For *CED 2011 Revised*, the low case grows at 1.41 percent per year from 2011-2020 while the high case grows at 1.82 percent, compared to 1.65 percent in *CED 2009*. Rates of growth between the three scenarios were relatively similar since differences in personal income estimates among the scenarios were small. Because of a drop in recorded consumption of 219 GWh from 2009 to 2010, the *CED 2011 Revised* forecast starts somewhat lower than the projection made in 2009.

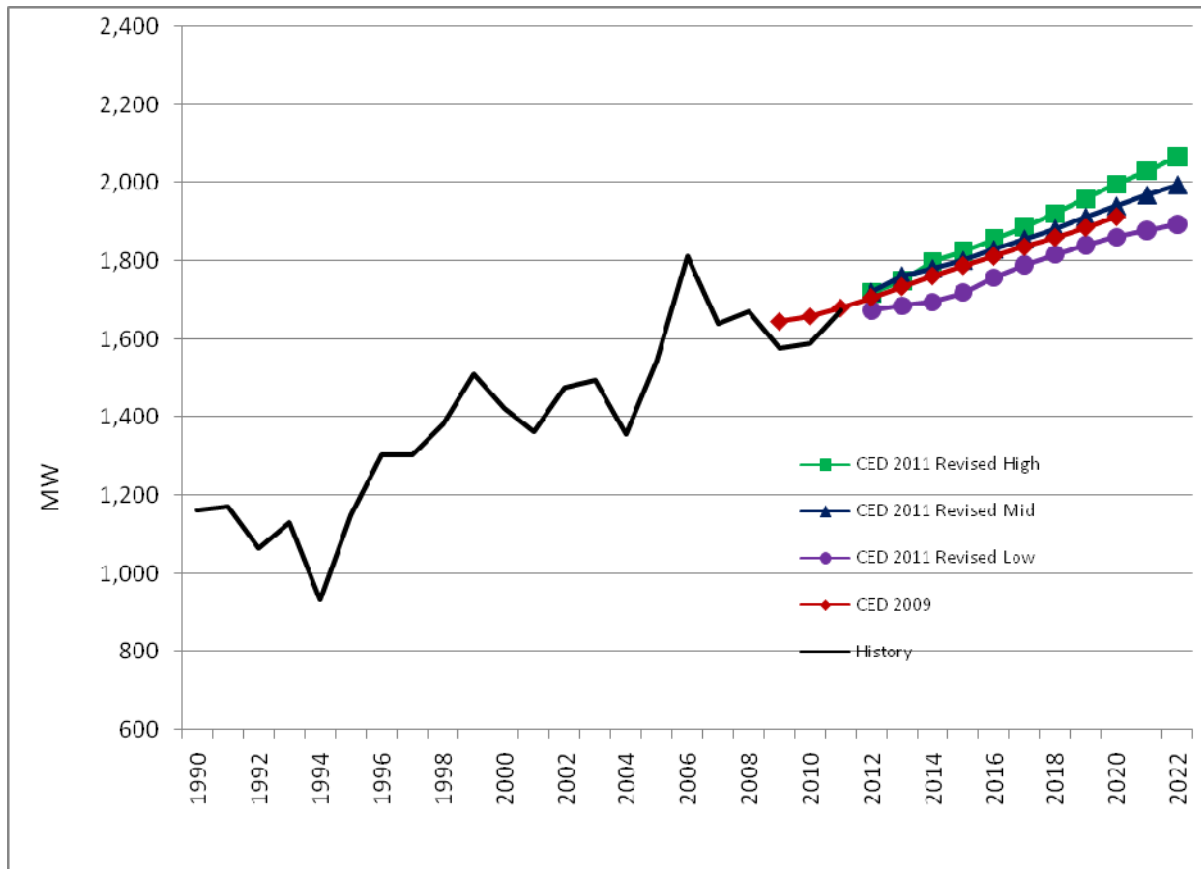
Figure 4-6: SMUD Planning Area Residential Consumption



Source: California Energy Commission, 2012

Figure 4-7 compares the *CED 2011 Revised* and *CED 2009* residential peak demand forecasts. Historical residential peak for 2011 was 1,675 MW, which was near the value predicted by *CED 2009*. Both the mid case *CED 2011 Revised* and *CED 2009* forecasts are similar and grow at annual rates from 2012 through 2020 of 1.53 percent and 1.43 percent, respectively. From 2011 through 2022, the low case grows at an annual rate of 1.48 percent, the mid case at 1.92, percent and the high case at 2.21 percent.

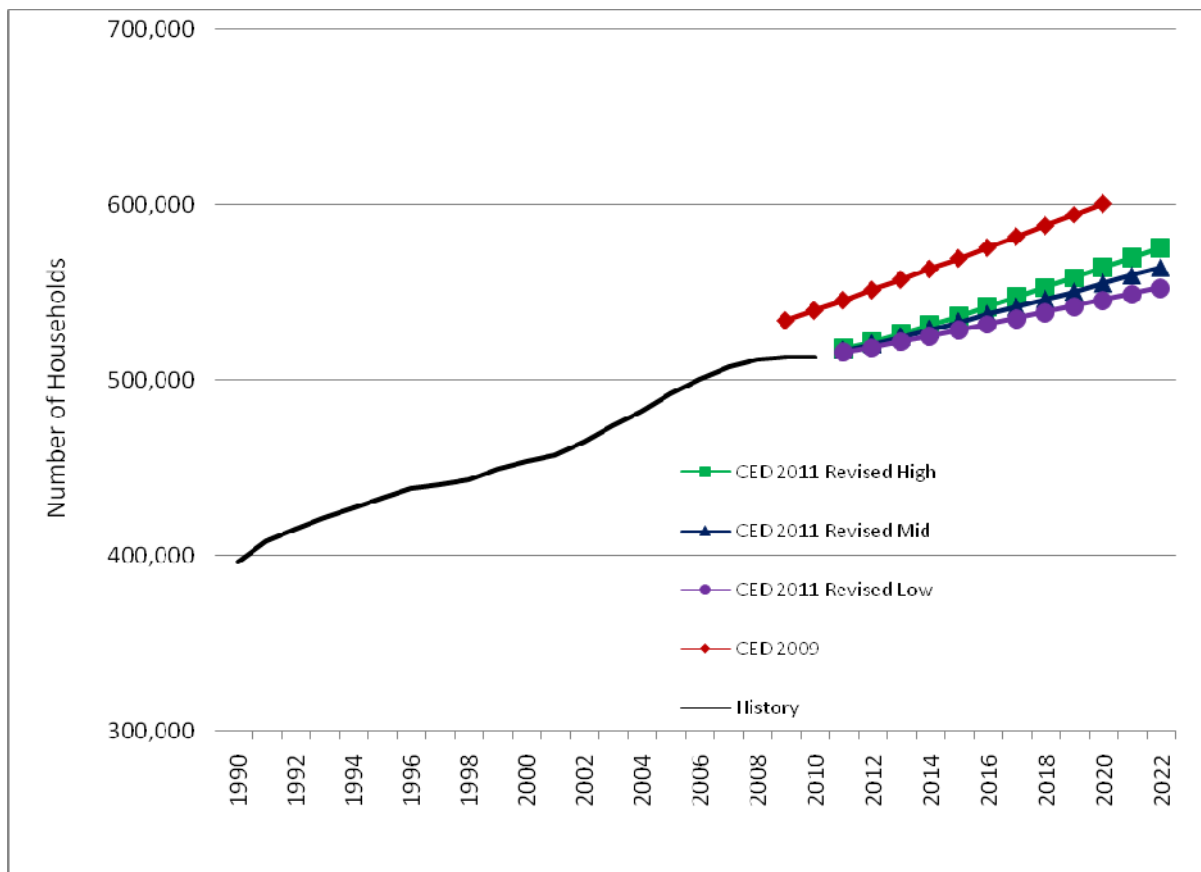
Figure 4-7: SMUD Planning Area Residential Peak



Source: California Energy Commission, 2012

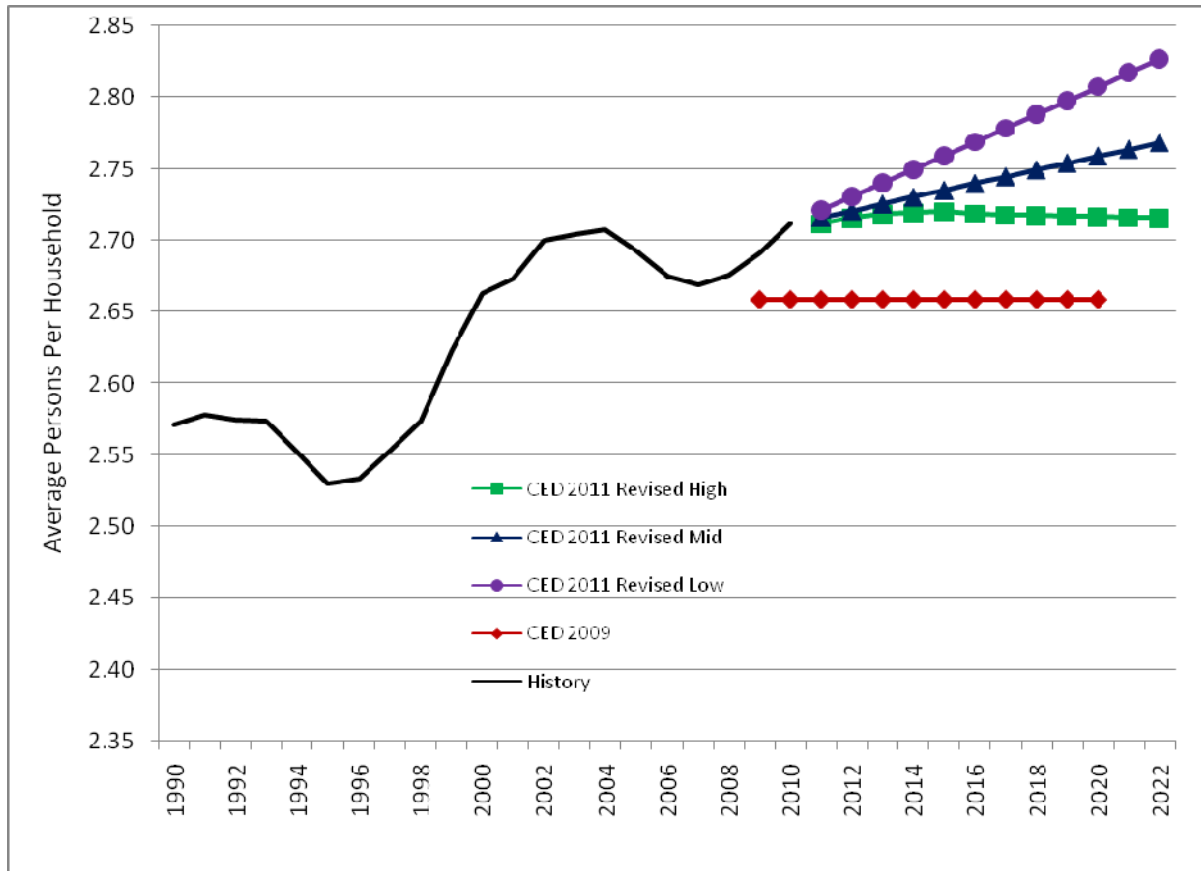
Figure 4-8 below and **Figure 4-9** shown on the next page compares the residential economic/demographic drivers used in the *CED 2011 Revised* forecast with drivers used in *CED 2009*. **Figure 4-8** compares total households, and **Figure 4-9** compares persons per household projections. The *CED 2011 Revised* forecast of households, is lower in all cases than the *CED 2009* forecast because of higher projections in persons per household used in the current forecast. By 2020, *CED 2011 Revised* predicts around 555,000 versus 600,000 in *CED 2009*. For the *CED 2011 Revised* mid case, persons per household reach just over 2.76 in 2020, compared to a projection of 2.66 for *CED 2009*.

Figure 4-8: SMUD Planning Area Residential Household Projections



Source: California Energy Commission, 2012

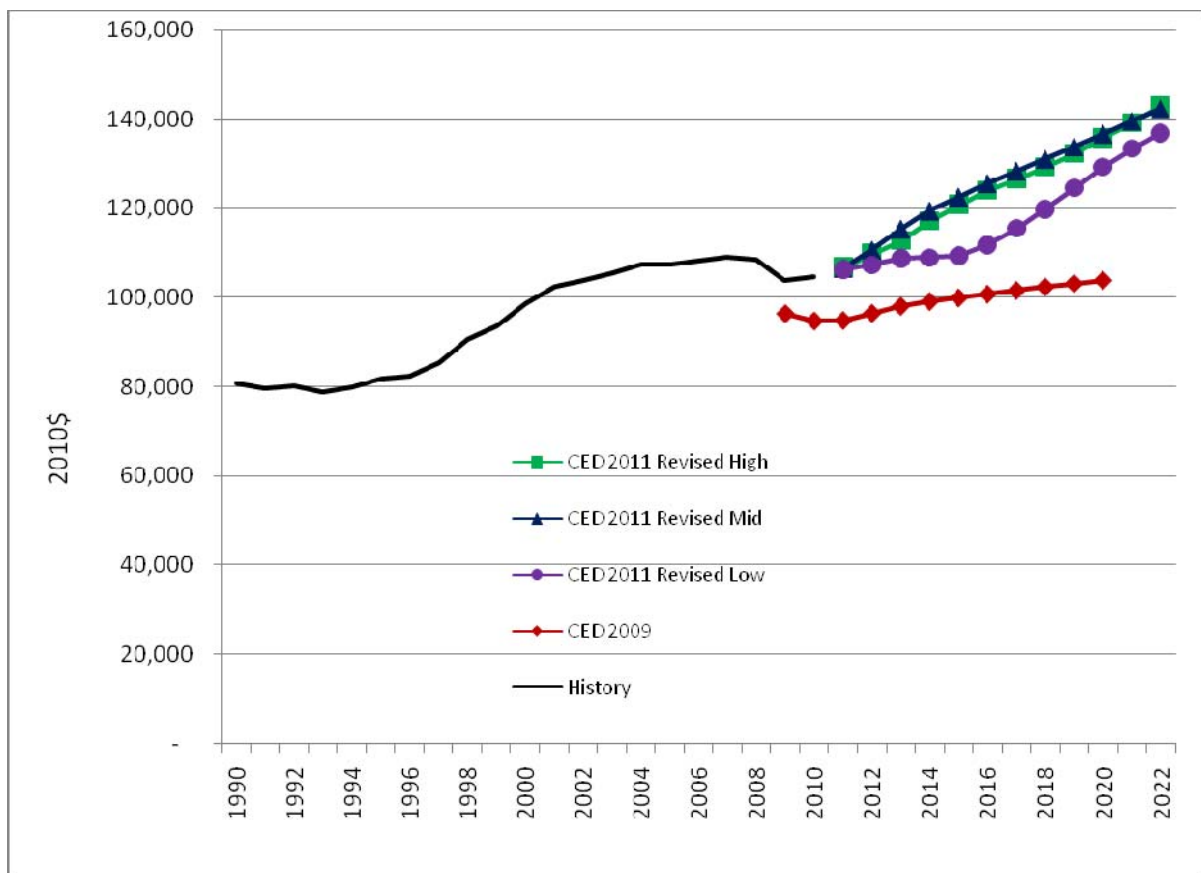
Figure 4-9: SMUD Planning Area Persons per Household Projections



Source: California Energy Commission 2012

Figure 4-10 compares average household income between the two forecasts. The growth rate of income between 2010 and 2020 is higher in all three scenarios compared to *CED 2009*, as both Global Insight and Moody's project faster total personal income growth. Income per household in the high demand case is slightly lower than in the mid case until the end of the forecast period where the two scenarios are nearly identical. This is due to lower total household income in the early years of the forecast in the high scenario compared to the mid case, as well as differences in the projected growth rate of households compared to total household income. The *CED 2009* projection declines in the short term as a result of the economic downturn and then grows at a much slower rate than in the *CED 2011 Revised* scenarios in the mid-to long term.

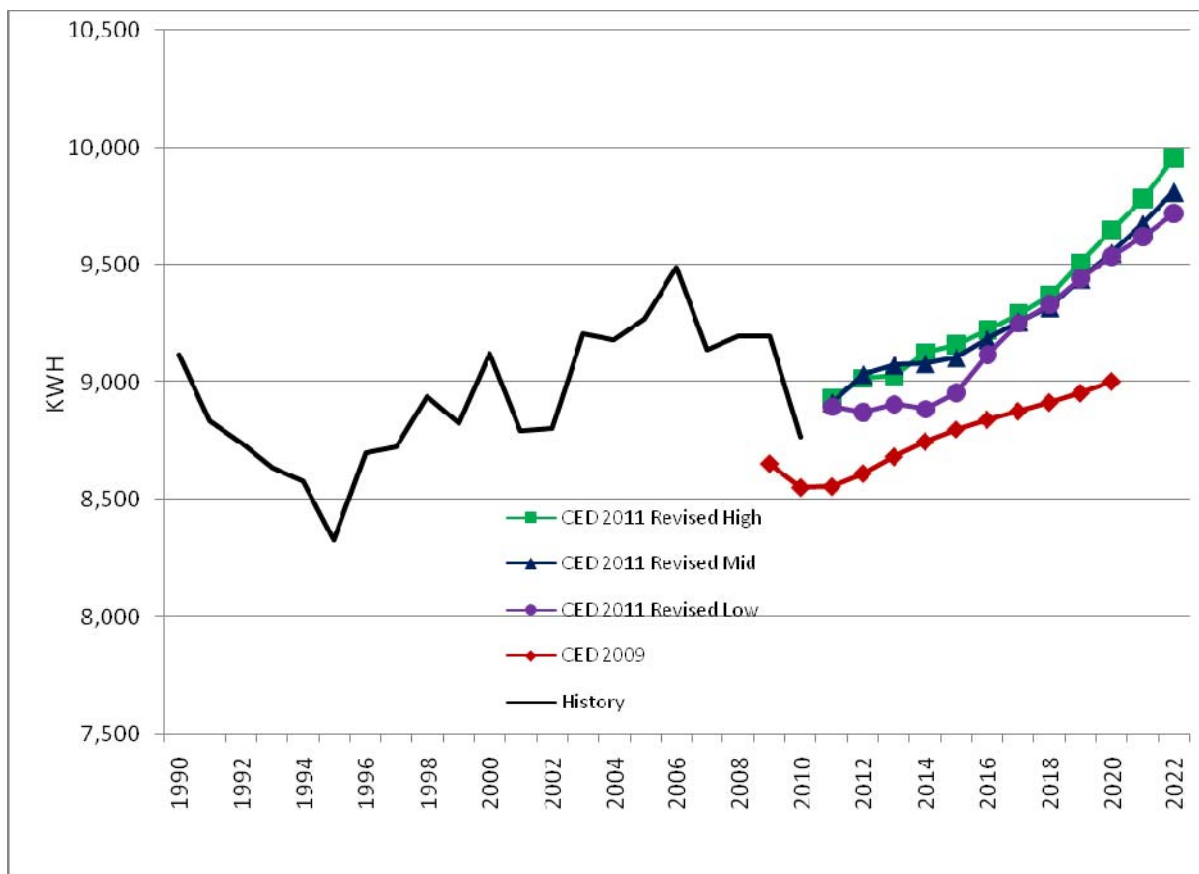
Figure 4-10: SMUD Planning Area Average Household Income Projections



Source: California Energy Commission 2012

Figure 4-11 compares electricity use per household between the two forecasts as well as the 1990–2010 historical series. Use per household starts near the historical mid-range for all three scenarios but significantly surpasses historical highs by the end of the forecast period. *CED 2011 Revised* use per household is expected to rise to 9,550 kWh per household in 2020 in the mid case, growing at 0.77 percent compared to 9,000 kWh per household predicted in the *CED 2009* forecast. As in the case of per capita electricity consumption, higher growth in consumption per household results from faster income growth and increased numbers of electric vehicles. The use per household for all three scenarios has increased relative to *CED 2009* since the number of households has been revised downward.

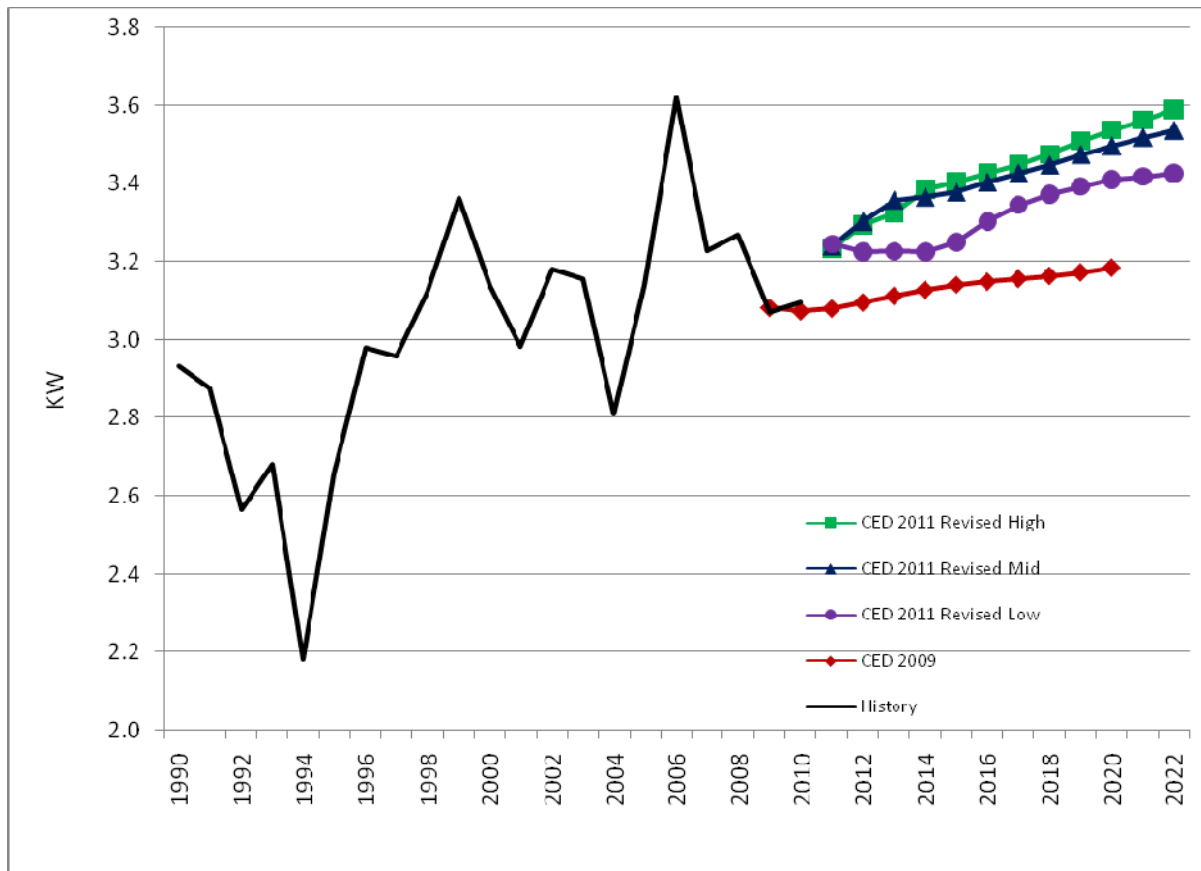
Figure 4-11: SMUD Planning Area Electricity Use per Household



Source: California Energy Commission, 2012

The increases in peak use per household for all three new scenarios shown in **Figure 4-12** are less than those predicted for energy use per household, since charging electric vehicles has little effect on peak but a large impact on energy consumption. For the mid case, growth rate for peak use per household is 1.12 percent per year over the *CED 2011 Revised* forecast period. Peak use per household rises to 3.50 kW in 2020 in the mid case compared to 3.18 kW predicted in the *CED 2009* forecast.

Figure 4-12: SMUD Planning Area Peak Use per Household

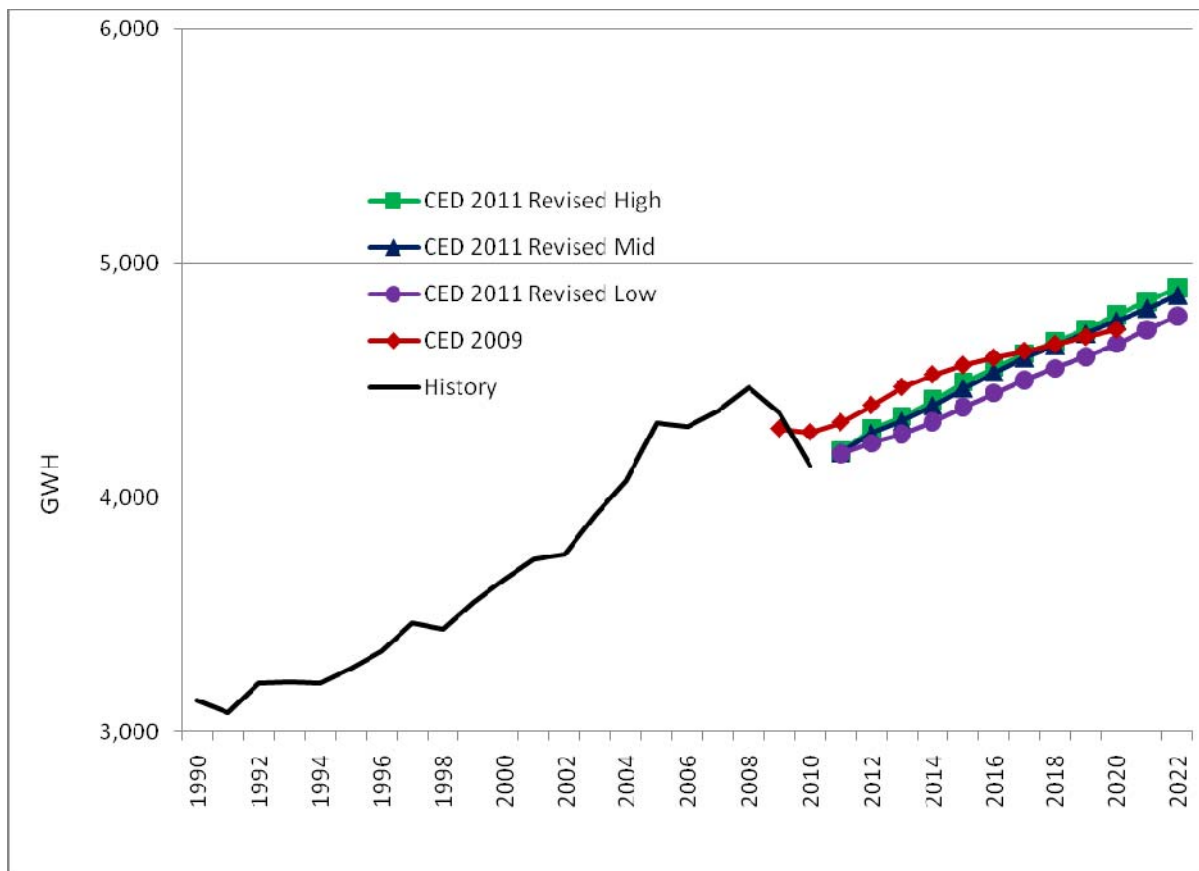


Source: California Energy Commission, 2012

Commercial Sector

Figure 4-13 compares the commercial sector forecasts. *CED 2011 Revised* begins slightly below the *CED 2009* forecast. Actual consumption in 2010 was lower than the projection from *CED 2009* since the effect of the recession in Sacramento was more severe than assumed in 2009. The *CED 2011 Revised* forecast grows at a faster rate from 2010-2020 in all three scenarios compared to *CED 2009* because of faster projected growth in floor space. The growth rate of the *CED 2011 Revised* commercial forecast in the mid case is 1.36 percent over the forecast period.

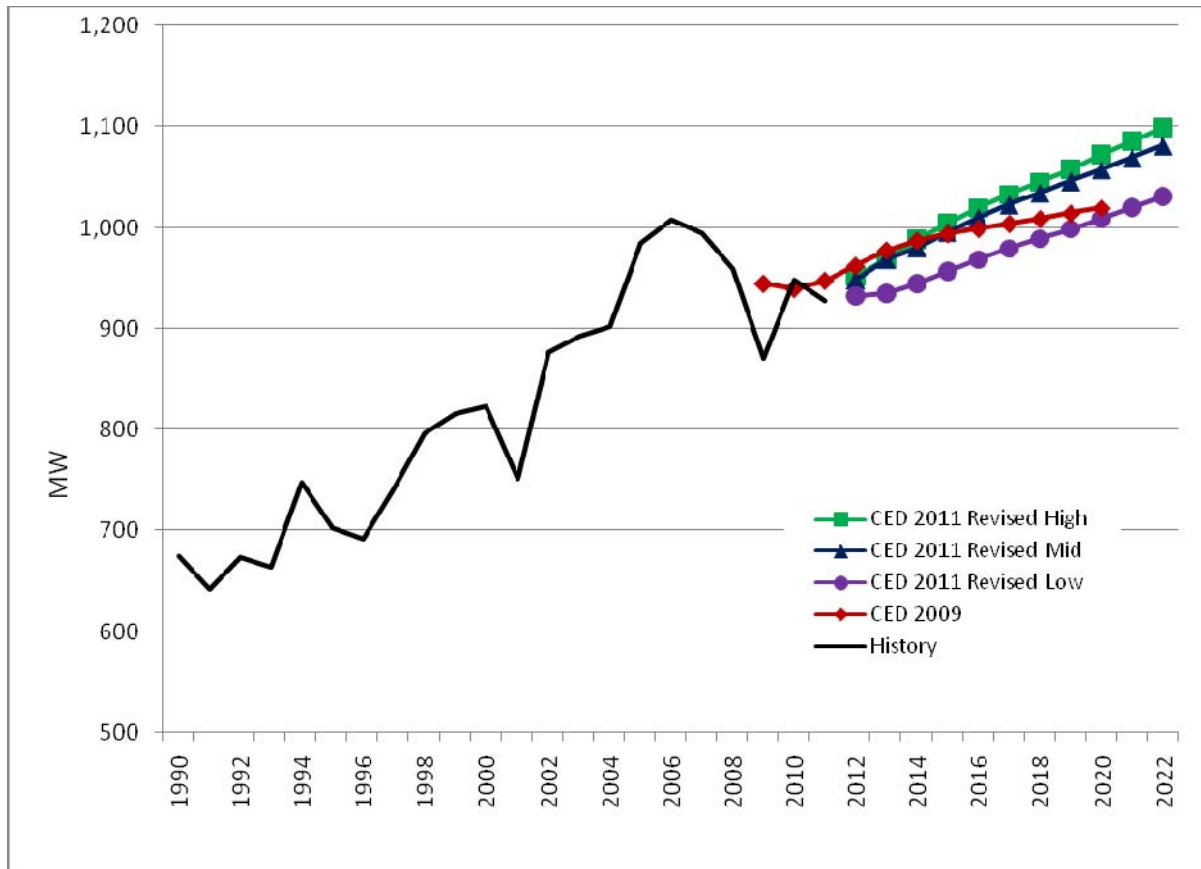
Figure 4-13: SMUD Planning Area Commercial Consumption



Source: California Energy Commission, 2012

Figure 4-14 compares the commercial peak demand forecasts. The *CED 2011 Revised* mid demand forecast starts lower than the *CED 2009* commercial peak forecast until 2015 where they are equivalent, and then becomes higher for the remainder of the forecast period. Commercial peak grows at a rate of 1.11 percent per year in the mid case, from 927 MW in 2011 to 1,081 MW in 2022. The *CED 2009* forecast grew at an annual rate of 0.82 percent from 2011 through 2020. Differences in peak forecasts are driven primarily by the differences in electricity forecasts.

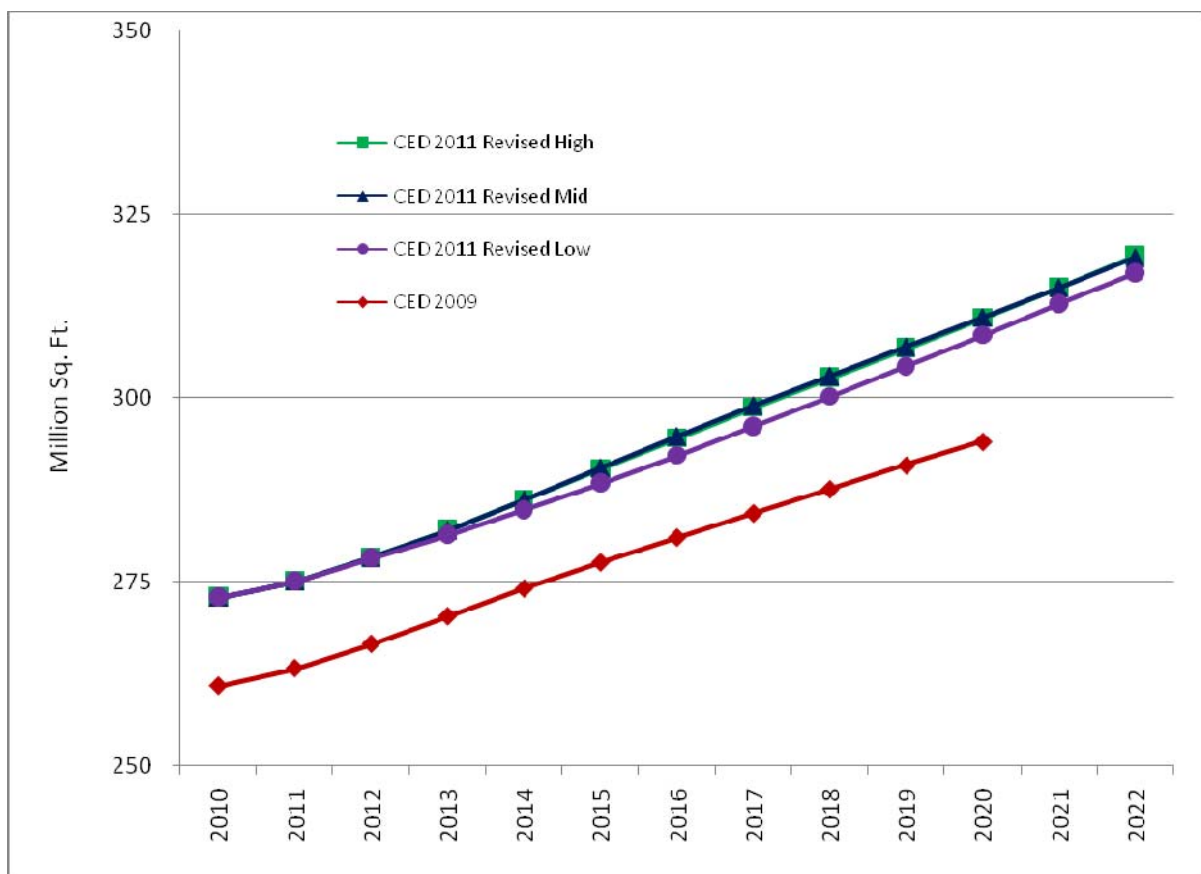
Figure 4-14: SMUD Planning Area Commercial Building Sector Peak



Source: California Energy Commission, 2012

In staff's commercial building sector forecasting model, floor space by building type (for example, retail, offices, schools, and hospitals) is the key driver of electricity growth. **Figure 4-15** compares total commercial floor space projections. Commercial floor space grows from 273 million square feet in 2010 to 319 million square feet in 2022. The *CED 2011 Revised* floor space projections are higher than those used in *CED 2009* primarily because estimated 2010 floor space for Sacramento is higher than predicted in 2009. From 2010 through 2020, the *CED 2011* mid case floor space forecast grew at an annual rate of 1.32 percent compared to 1.21 percent for *CED 2009*. The three floor space scenarios do not vary significantly, reflecting the importance of population in the floor space econometric model, which is held constant across the scenarios.

Figure 4-15: SMUD Planning Area Commercial Floor Space

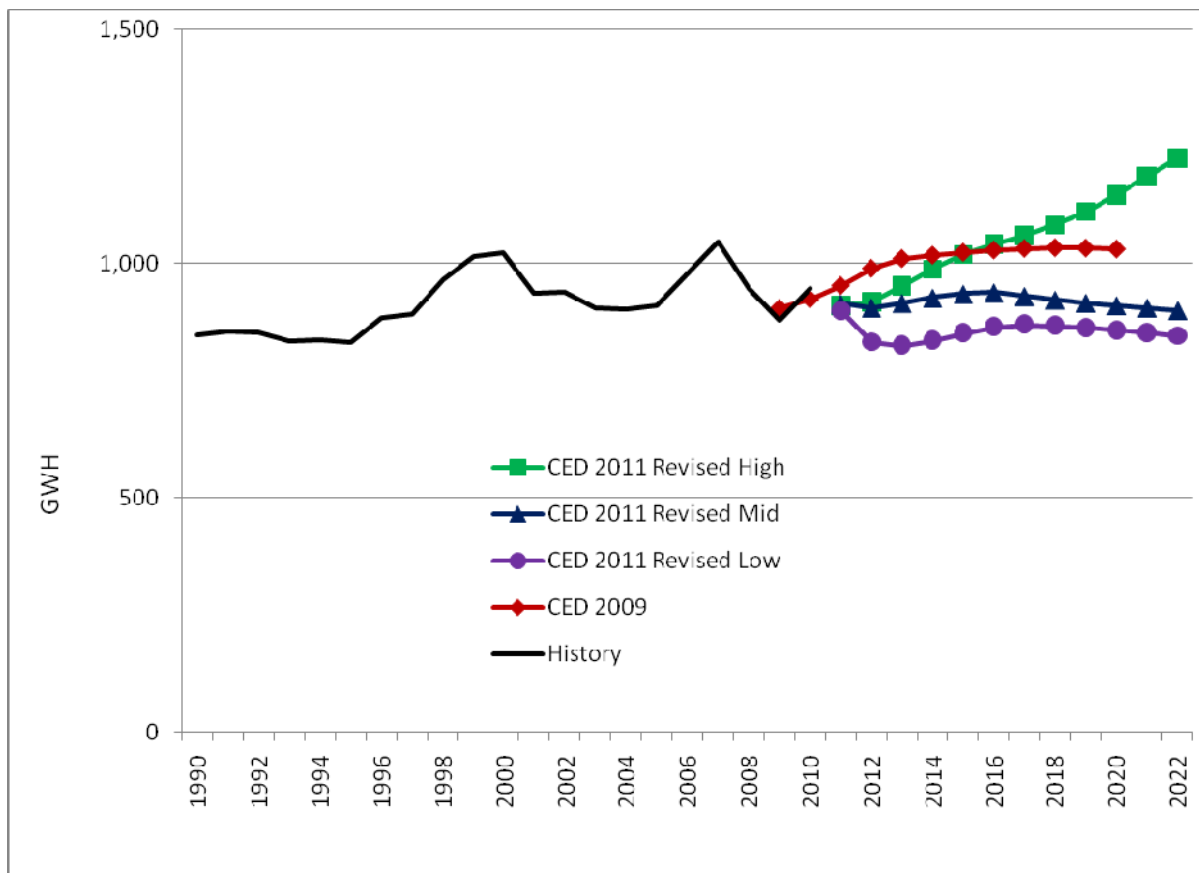


Source: California Energy Commission, 2012

Industrial Sector

Figure 4-16 compares the SMUD planning area industrial sector electricity consumption forecasts. *CED 2011 Revised* industrial electricity consumption forecast starts slightly lower in all three cases than was predicted in 2009. The low and mid cases initially decline by a small amount, start to recover, but slip back into decline by the end of the forecast period. Overall, growth drops by 0.41 percent per year in the mid case from 2011-2022. Growth in manufacturing and construction is projected to be much stronger in the (Global Insight) high demand scenario, so that consumption continues to increase at 2.18 percent on average throughout the forecast period.

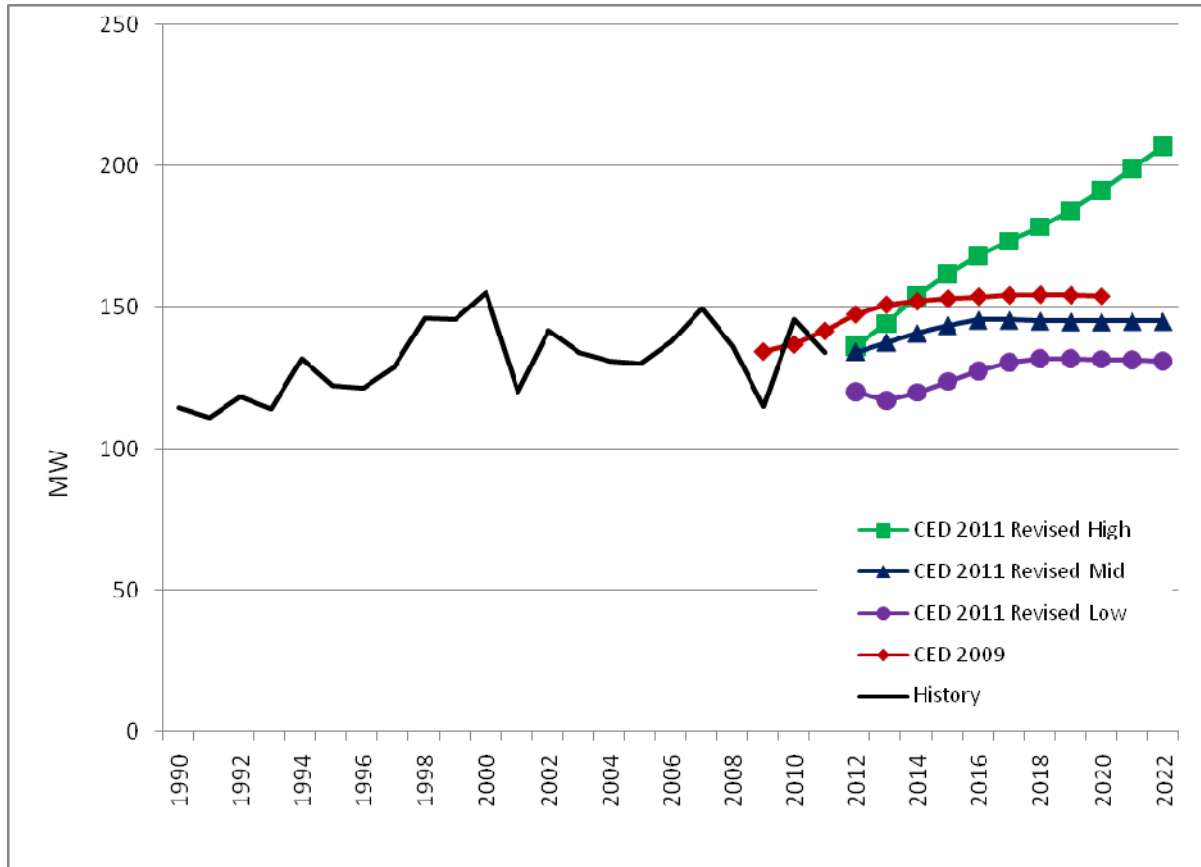
Figure 4-16: SMUD Planning Area Industrial Consumption



Source: California Energy Commission, 2012

Figure 4-17 compares the industrial sector peak forecasts, which are very similar to the energy forecasts. The *CED 2011 Revised* peak forecast in the mid case increases from 134 MW in 2011 to 144 MW in 2015, at which point it is expected to remain flat until the end of the forecast period.

Figure 4-17: SMUD Planning Area Industrial Sector Peak

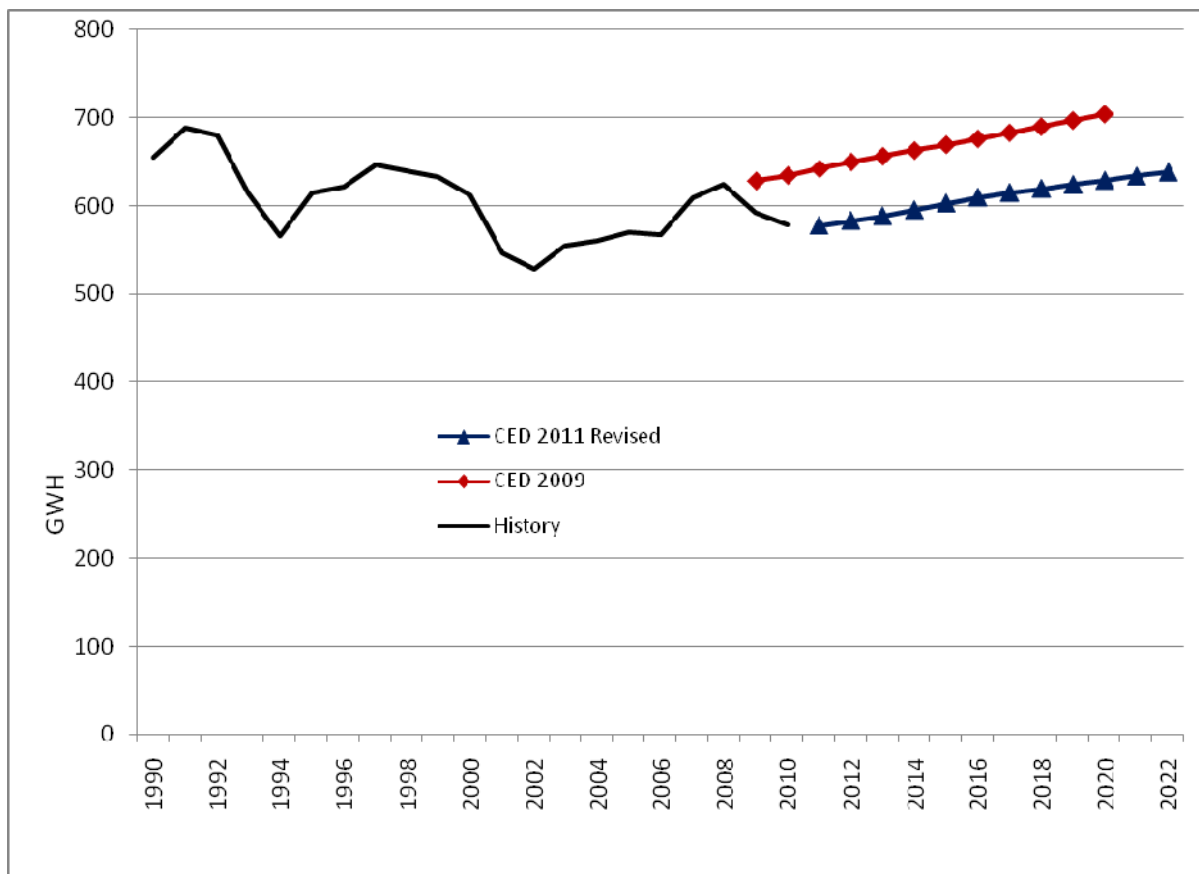


Source: California Energy Commission, 2012

Other Sectors

Figure 4-18 below and **Figure 4-19** shown on the next page compare the remaining sector electricity consumption forecasts. **Figure 4-18** compares the transportation communications and utilities (TCU) sector forecasts, which include street lighting. In this case, a single scenario was run.⁴ The *CED 2011 Revised* forecast is lower than the *CED 2009* forecast primarily due to a lower historic starting point. The *CED 2009* forecast grows at about 1 percent over the forecast period, while the *CED 2011 Revised* forecast grows at 0.82 percent. The historical decline of TCU electricity consumption from 1990 through 2001 is a result of military base closures. However, since 2002, the sector has experienced steady growth of just over 1 percent per year.

Figure 4-18: SMUD Planning Area Transportation, Communications and Utilities Sector Electricity Consumption

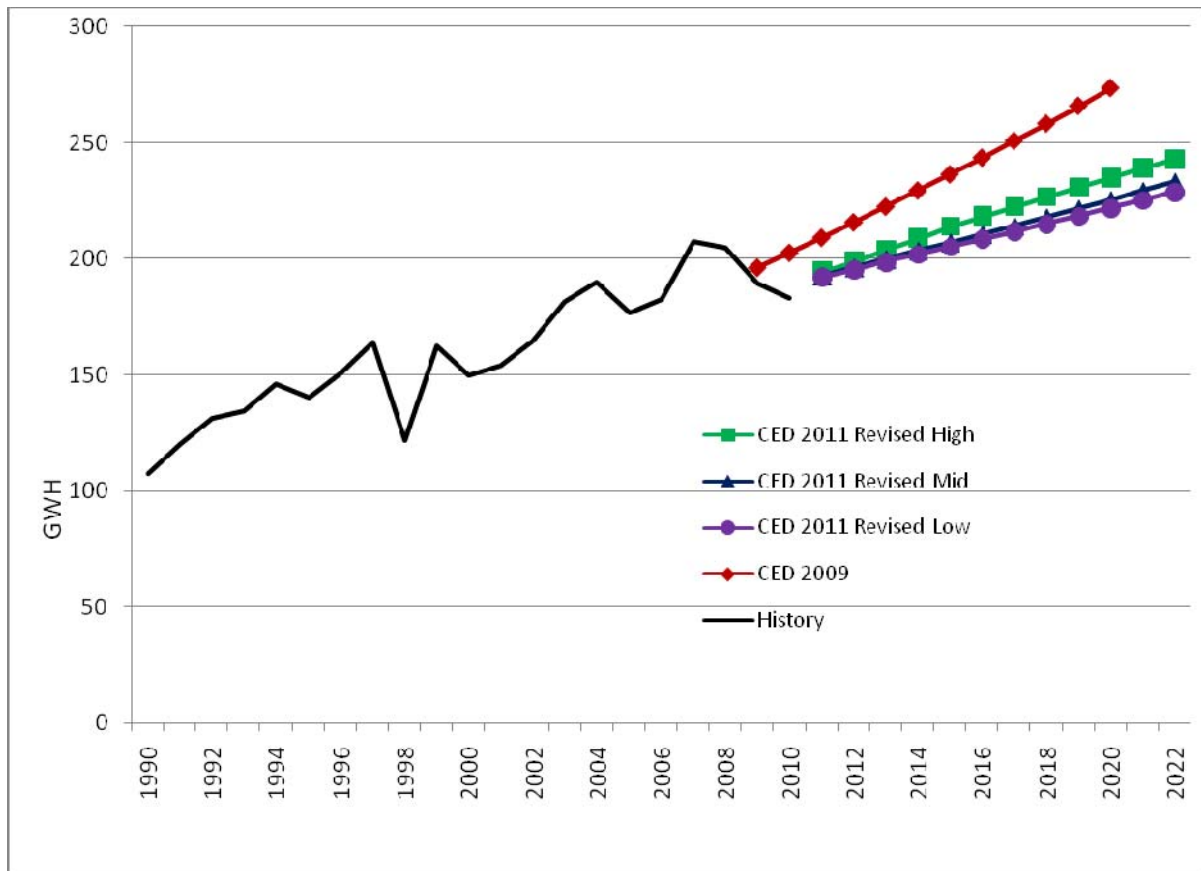


Source: California Energy Commission, 2012

⁴ Growth in TCU consumption depends mainly on population, for which there is only one scenario.

Figure 4-19 compares the agriculture and water pumping sector forecasts. Historical electricity use has been dropping for three straight years but is expected to recover starting in 2011 for all three scenarios. Annual growth rates range from 1.89 percent in the low case to 2.39 percent in the high case. By 2022, the high case is 6.0 percent larger than the low case. The *CED 2011 Revised* agriculture and water pumping forecast grows at an annual rate of 1.8 percent in the mid case from 2011-2020 compared to 3.0 percent for *CED 2009*. Slower growth in the number of households in the *CED 2011 Revised* forecast compared to *CED 2009* drive the results and keep consumption growth below that in the 2009 forecast.

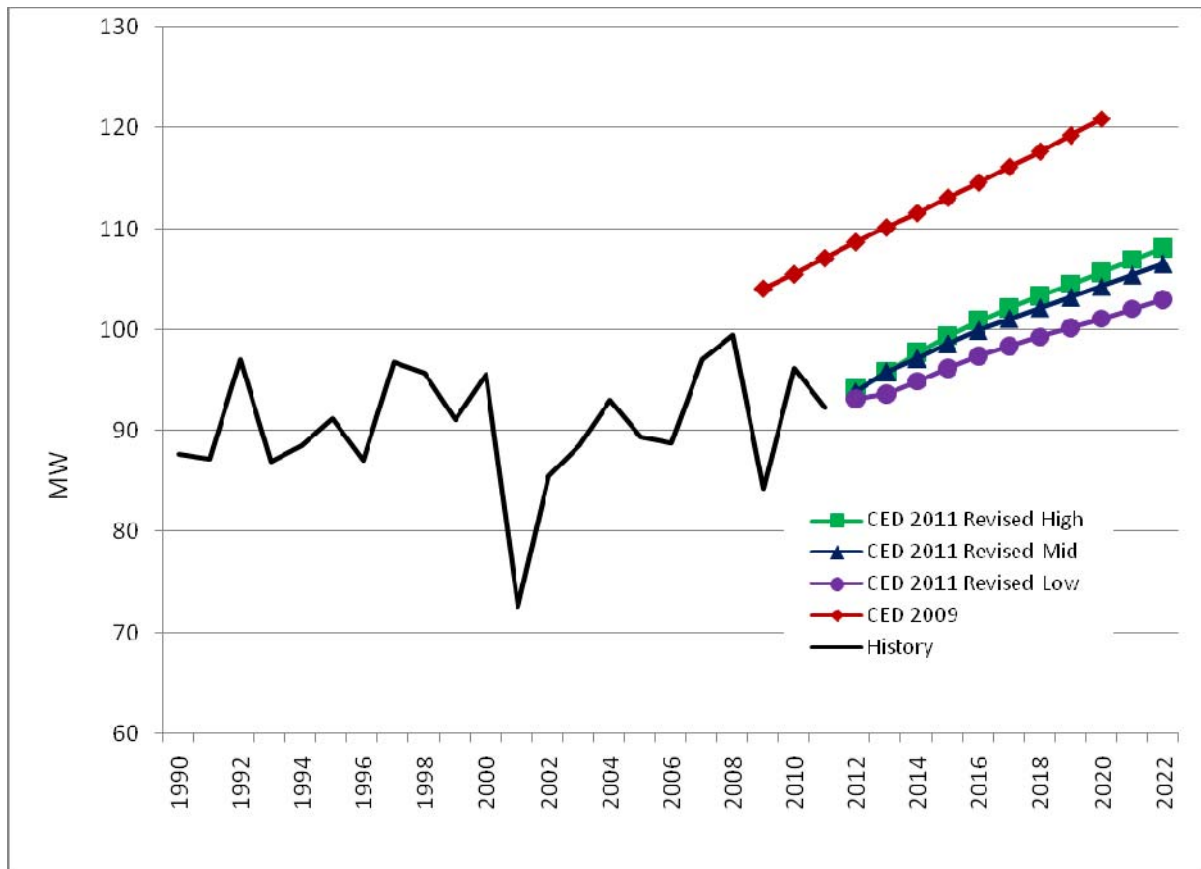
Figure 4-19: SMUD Planning Area Agriculture and Water Pumping Electricity Consumption Forecasts



Source: California Energy Commission, 2012

Figure 4-20 compares the combined “other” sector peaks for the *CED 2011 Revised* and *CED 2009* forecasts, which includes the TCU sector, the street lighting sector, and the agriculture and water pumping sector. The *CED 2011 Revised* forecasts are lower over the entire forecast period than the *CED 2009*, given a lower assumed starting point resulting from a reclassification of historical consumption. The 1.33 percent annual growth rate of the *CED 2011 Revised* forecast is identical to the *CED 2009* forecast from 2012 through 2020.

Figure 4-20: SMUD Planning Area Other Sector Peak

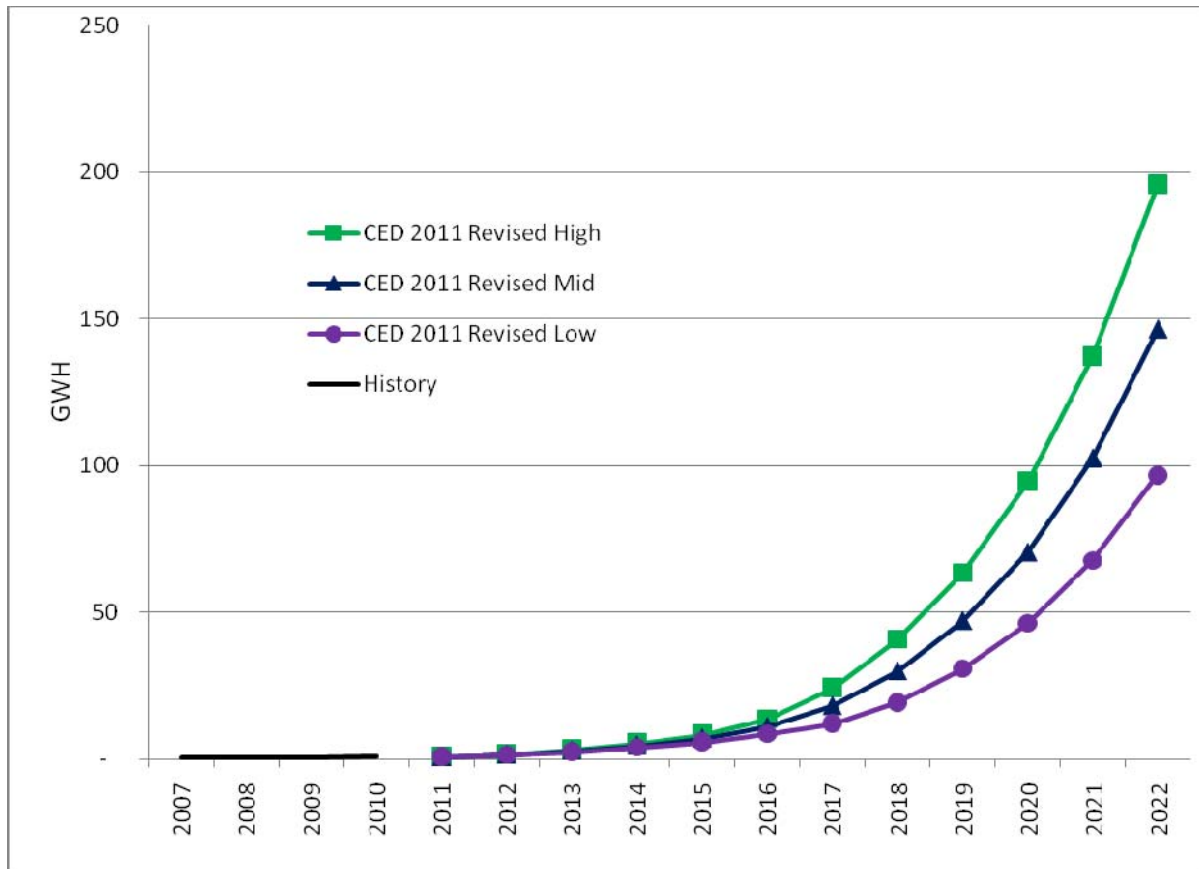


Source: California Energy Commission, 2012

Electric Vehicles

Consumption by electric vehicles in 2010 was less than 1 GWh and is expected to rise to 11 GWh by 2016 in the mid demand case, as shown in **Figure 4-21**. By the end of the forecast period, total electricity used by electric vehicles is projected to be 146 GWh in the mid case. Staff assumed that most recharging would occur during off-peak hours so that peak impacts would be relatively small.

Figure 4-21: SMUD Electricity Consumption of Electric Vehicles



Source: California Energy Commission, 2012

Self-Generation

As shown in **Table 4-2**, the peak demand forecast is reduced by self-generation, including the effects of the SGIP, CSI, and other programs, as discussed in Volume 1. The effects of these programs are forecast based on recent trends in installations and a predictive model for the residential sector. Staff projects about 38 MW of peak reduction from photovoltaic (PV) systems by 2022 in the mid demand case. Peak reductions are based on installed system capacities ranging from 72 MW by 2022 in the high demand case to 83 MW by 2022 in the low demand case.

Table 4-2: SMUD Peak Demand Reductions from Self-Generation (MW)

	1990	2000	2010	2015	2020	2022
Non-Photovoltaic Self-Generation	0.00	0.00	1.74	1.74	1.74	1.74
Photovoltaic, Low Demand	1.05	2.39	16.94	22.01	32.03	42.06
Photovoltaic, Mid Demand	1.05	2.39	16.94	20.69	28.31	37.90
Photovoltaic, High Demand	1.05	2.39	16.94	20.51	27.59	36.63
Total Self-Generation, Low Demand	1.05	2.39	18.68	23.75	33.78	43.80
Total Self-Generation, Mid Demand	1.05	2.39	18.68	22.43	30.05	39.64
Total Self-Generation, High Demand	1.05	2.39	18.68	22.25	29.34	38.37

Source: California Energy Commission, 2012

Conservation/Efficiency Impacts

Table 4-3 and **Table 4-4** show electricity consumption and peak savings estimates for building and appliance standards for the mid demand scenario. Total standards impacts are higher in the high demand case by 1.5-2.0 percent because of higher floor space and home construction values and 1.5-2.0 percent lower in the low demand case. The standards savings estimates include the 2010 revision to Title 24 building standards as well as AB 1109 lighting savings and television standard savings. Savings are measured against a baseline before 1975, so they incorporate more than 30 years of impacts. Volume 1 provides more detail on staff work related to energy efficiency and conservation.

Table 4-3: SMUD Planning Area Electricity Consumption Savings Estimates from Standards, Mid Demand Scenario

Electricity Consumption Savings (GWh)							
	Residential			Commercial			
	Building Standards	Appliance Standards	Total	Building Standards	Appliance Standards	Total	Total Standards
1990	488	148	636	73	40	112	748
2000	774	399	1,173	186	107	293	1,466
2010	937	714	1,651	357	183	540	2,191
2015	1,056	1,021	2,077	443	235	678	2,755
2020	1,173	1,250	2,423	542	311	853	3,276
2022	1,211	1,286	2,498	584	325	909	3,407

Source: California Energy Commission, 2012

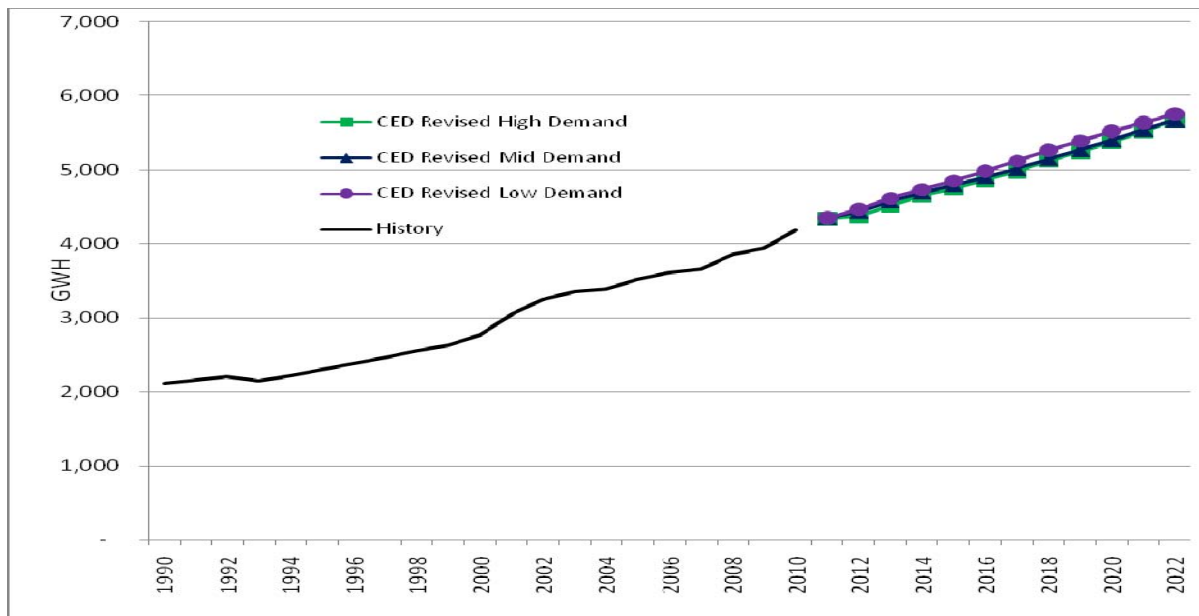
Table 4-4: SMUD Planning Area Electricity Peak Savings Estimates From Standards, Mid Demand Scenario

Electricity Peak Demand Savings (MW)							
	Residential			Commercial			
	Building Standards	Appliance Standards	Total	Building Standards	Appliance Standards	Total	Total Standards
1990	157	48	205	16	9	24	229
2000	266	138	404	43	24	67	471
2010	331	252	583	82	42	124	707
2015	392	379	771	99	52	151	922
2020	429	458	887	121	69	190	1,077
2022	437	464	900	130	72	202	1,102

Source: California Energy Commission, 2012

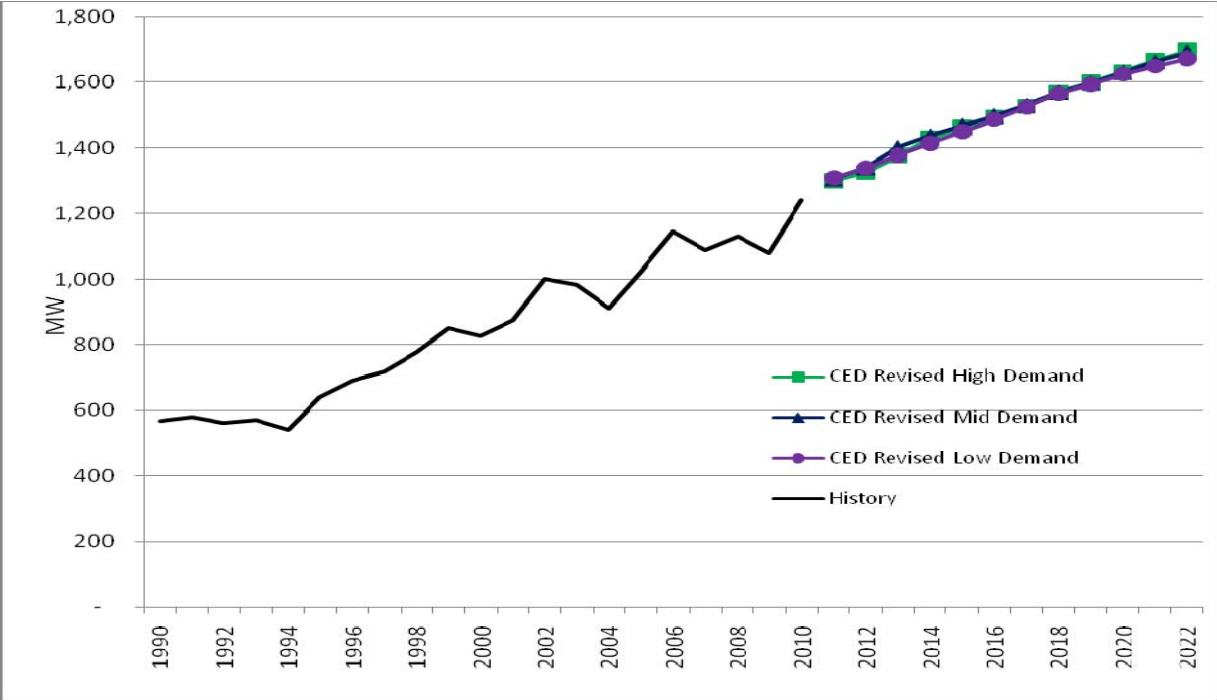
Figure 4-22 below and **Figure 4-23** on the following page show forecasts of total savings impacts on electricity and peak demand from all committed sources, including building and appliance standards; utility and public agency programs implemented before 2013; and price and other effects, or savings associated with rate changes and certain market trends not directly related to programs or standards. Savings are measured against a 1975 baseline, so they incorporate more than 30 years of impacts from rate changes and standards. Projected savings impacts are higher the lower the demand scenario, since price and program effects are inversely related to the demand outcome.

Figure 4-22: SMUD Efficiency GWh



Source: California Energy Commission, 2012

Figure 4-23: SMUD Efficiency MW



Source: California Energy Commission, 2012

CHAPTER 5: Los Angeles Department of Water and Power

The Los Angeles Department of Water and Power (LADWP) planning area includes LADWP bundled retail customers and customers served by energy service providers using the LADWP distribution system to deliver electricity to end users.

This chapter is organized as follows. First, forecasted consumption and peak loads for the LADWP planning area are discussed; both total and per capita values are presented. The *CED 2011 Revised* values are compared to the *CED 2009* forecast; significant differences between the two forecasts are explained. The forecasted load factor, jointly determined by the consumption and peak load estimates, is also discussed. Second, sector consumption and peak load forecasts are presented. The residential, commercial, industrial, and “other” sector forecasts are compared to those in *CED 2009*. Finally, results for electric vehicles, self-generation, and efficiency are discussed.

Forecast Results

Table 5-1 shown on the next page presents a comparison of electricity consumption and peak demand for selected years. **Figure 5-1** and **Figure 5-2** in the following pages present a comparison of the *CED 2011 Revised* forecast with the *CED 2009* forecast.

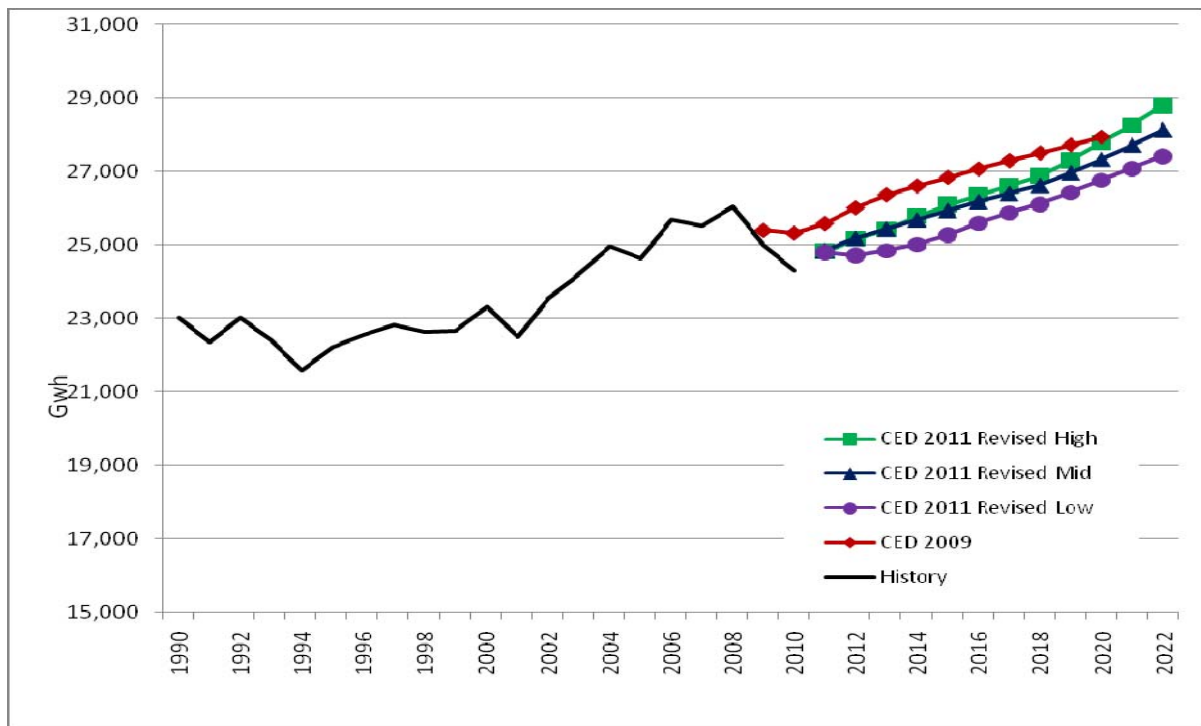
For both consumption and peak demand, growth rates starting in 2011 are shown to compare weather-normalized growth rates, since consumption in 2010 was reduced significantly due to a very mild weather year overall while peak demand was historically high as a result of a heat storm in September 2010. A weather-normalized comparison (2011-2020) shows faster growth in the mid and high demand cases for consumption and in all three cases for peak demand compared to *CED 2009*. These differences result from faster income growth in the mid and high cases and faster household growth in all three scenarios versus *CED 2009*. In addition, peak demand is increased in the mid and high cases due to an adjustment to reflect potential climate change. (see Chapter 1 of Volume I.)

Table 5-1: LADWP Planning Area Forecast Comparison

Consumption (GWh)				
	<i>CED 2009</i> (Dec. 2009)	<i>CED 2011</i> <i>Revised-High</i>	<i>CED 2011</i> <i>Revised-Mid</i>	<i>CED 2011</i> <i>Revised-Low</i>
1990	23,263	23,038	23,038	23,038
2000	23,438	23,341	23,341	23,341
2010	25,326	24,294	24,294	24,294
2011	25,589	24,810	24,858	24,799
2015	26,841	26,094	25,940	25,266
2020	27,943	27,784	27,332	26,760
2022	--	28,817	28,128	27,426
Average Annual Growth Rates				
1990 - 2000	0.07%	0.13%	0.13%	0.13%
2000 - 2010	0.78%	0.40%	0.40%	0.40%
2011 - 2015	1.20%	1.27%	1.07%	0.47%
2011 - 2020	0.98%	1.27%	1.06%	0.85%
2011 - 2022	--	1.37%	1.13%	0.92%
Peak (MW)				
	<i>CED 2009</i> (Dec. 2009)	<i>CED 2011</i> <i>Revised-High</i>	<i>CED 2011</i> <i>Revised-Mid</i>	<i>CED 2011</i> <i>Revised-Low</i>
1990	5,341	5,341	5,341	5,341
2000	5,344	5,344	5,344	5,344
2011	5,846	5,907	5,907	5,907
2011*	5,846	5,946	5,946	5,946
2015	6,060	6,461	6,380	6,072
2020	6,247	6,952	6,771	6,438
2022	--	7,179	6,937	6,559
Average Annual Growth Rates				
1990 - 2000	0.01%	0.01%	0.01%	0.01%
2000 - 2011	0.82%	0.91%	0.91%	0.91%
2011* - 2015	0.91%	2.10%	1.78%	0.52%
2011* - 2020	0.74%	1.75%	1.45%	0.89%
2011* - 2022	--	1.73%	1.41%	0.90%
Historical values are shaded.				
*Weather normalized: <i>CED 2011 Revised</i> uses a weather-normalized peak value derived from the actual 2011 peak for calculating growth rates during the forecast period.				

Source: California Energy Commission, 2012

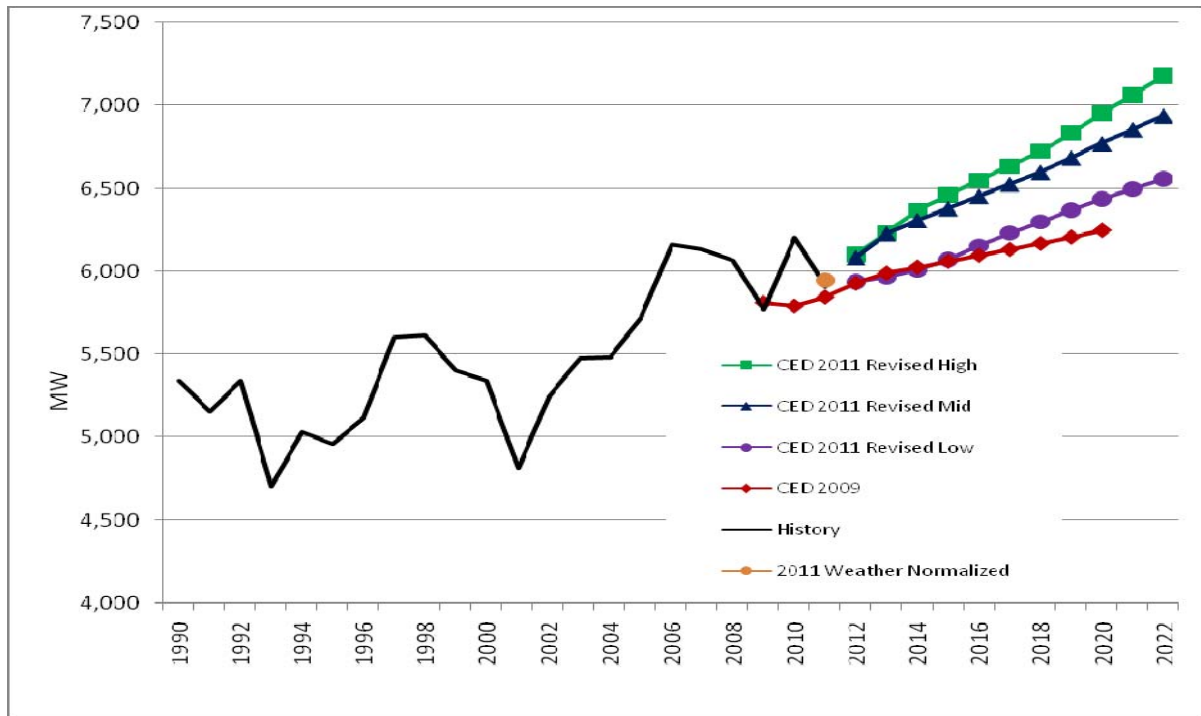
Figure 5-1: LADWP Planning Area Electricity Forecast



Source: California Energy Commission, 2012

The *Revised California Energy Demand Forecast 2012-2022 (CED) 2011 Revised* LADWP planning area peak demand forecast, shown in **Figure 5-2**, has higher growth rates than *CED 2009* for each of the three scenarios, although the low scenario dips below the 2009 forecast in the short term. By 2015, the low scenario is also higher than the *CED 2009* forecast.

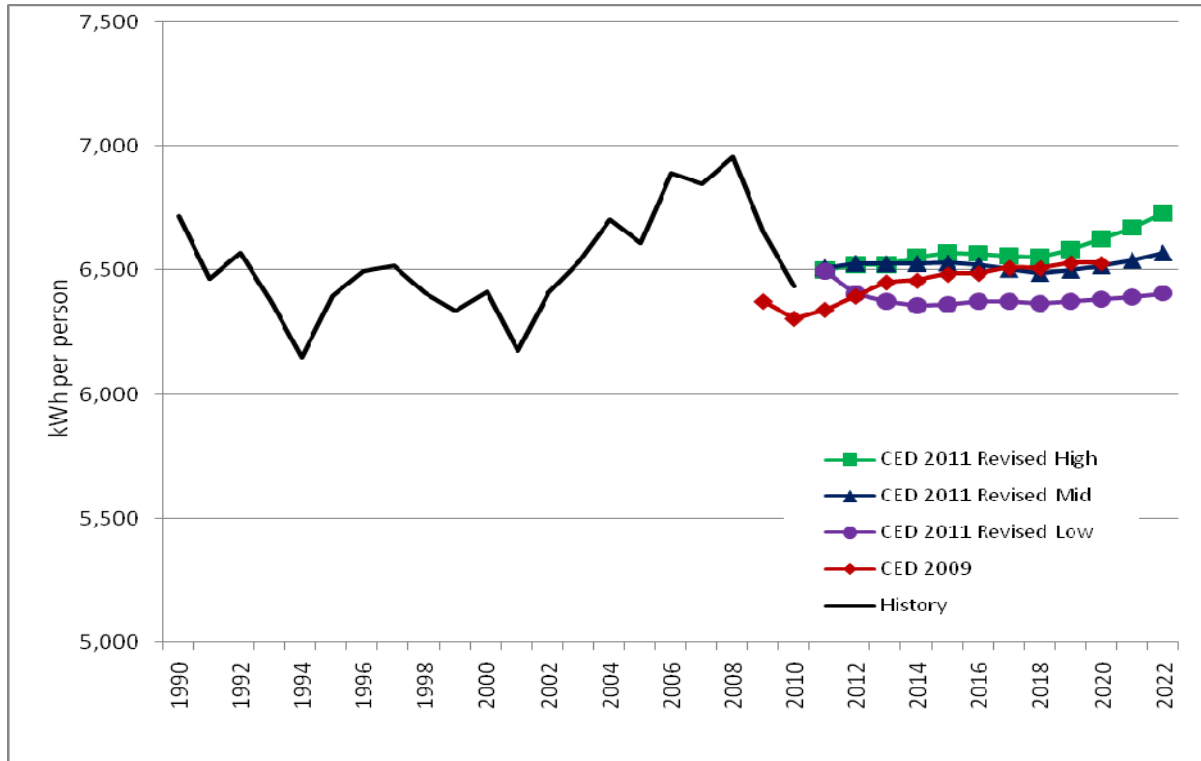
Figure 5-2: LADWP Planning Area Peak



Source: California Energy Commission, 2012

Figure 5-3 compares *CED 2011 Revised* and *CED 2009* per capita electricity consumption forecasts for the LADWP planning area. Projected per capita consumption in *CED 2011 Revised* begins higher than *CED 2009* in all three scenarios, with the low scenario then decreasing to less than the *CED 2009* level for most of the forecast period. *CED 2011 Revised* per capita electricity consumption is projected to be lower than pre-energy crisis levels. Per capita consumption rises slightly toward the end of the forecast period in all three scenarios, reflecting increasing numbers of electric vehicles.

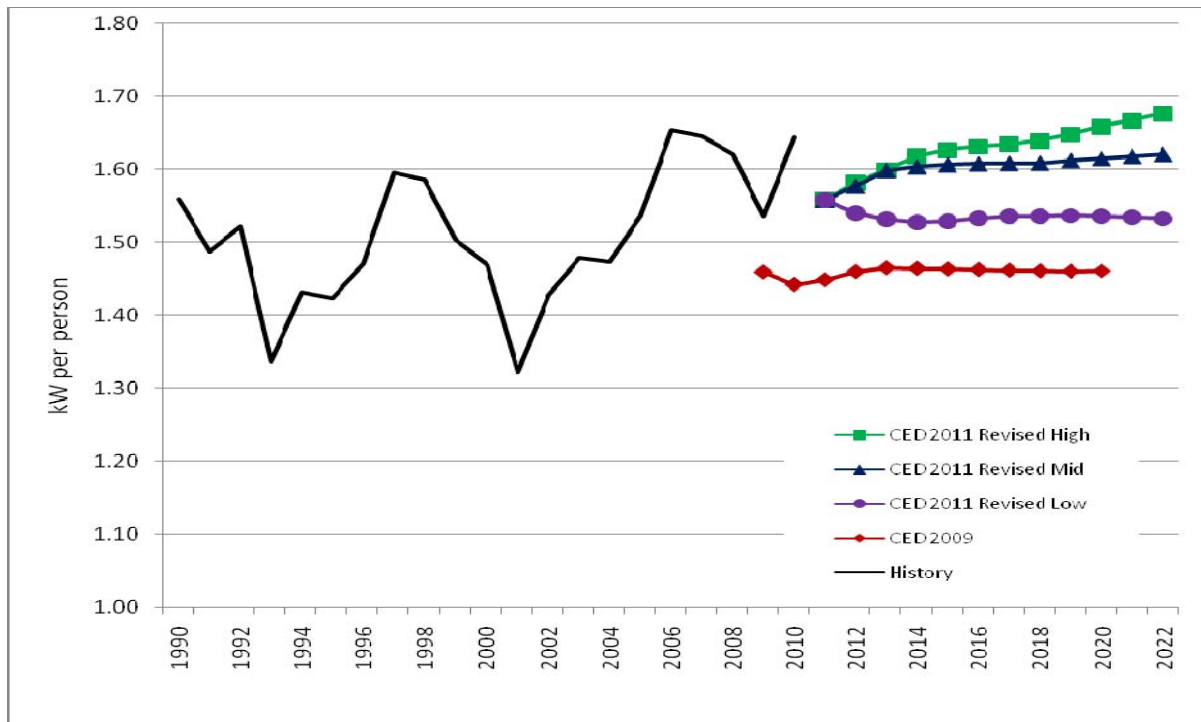
Figure 5-3: LADWP Planning Area per Capita Electricity Consumption



Source: California Energy Commission, 2012

CED 2011 Revised per capita peak demand, shown in **Figure 5-4**, is higher than the *CED 2009* projection throughout the forecast for all three scenarios. The low and mid scenarios have a relatively flat growth rate, similar to *CED 2009*. Faster economic growth in the high demand case keeps per capita peak growing throughout the forecast period.

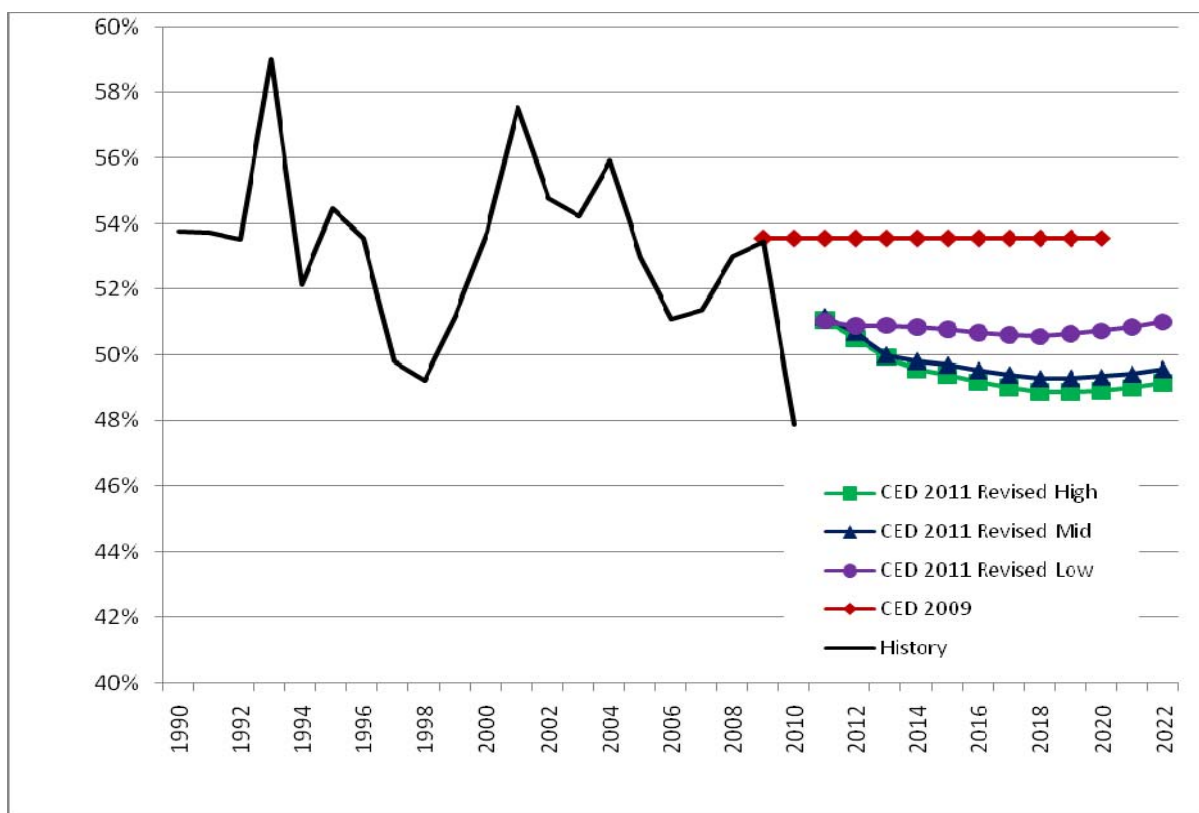
Figure 5-4: LADWP Planning Area per Capita Peak Demand



Source: California Energy Commission, 2012

Figure 5-5 compares the load factors of the two forecasts. The load factor represents the relationship between average energy demand and system peak. The smaller the load factor, the greater is the difference between peak and average hourly demand. Variation in historical load factors is caused in part by annual weather patterns. In years with extreme heat, demand peaks at higher levels and results in lower system load factors. Higher load factors indicate demand is more stable. The LADWP load factor has been declining since the mid-1990s, as the residential sector—with a continually increasing presence of air conditioning—grew faster than other sectors. The forecasted load factor continues to decline in the early years of the forecast, especially in the mid and high scenarios, as residential consumption increases as a proportion of total, thereby reducing the system load factor. The forecasted load factors increase in later years due to increasing electric vehicle usage.

Figure 5-5: LADWP Planning Area Load Factors



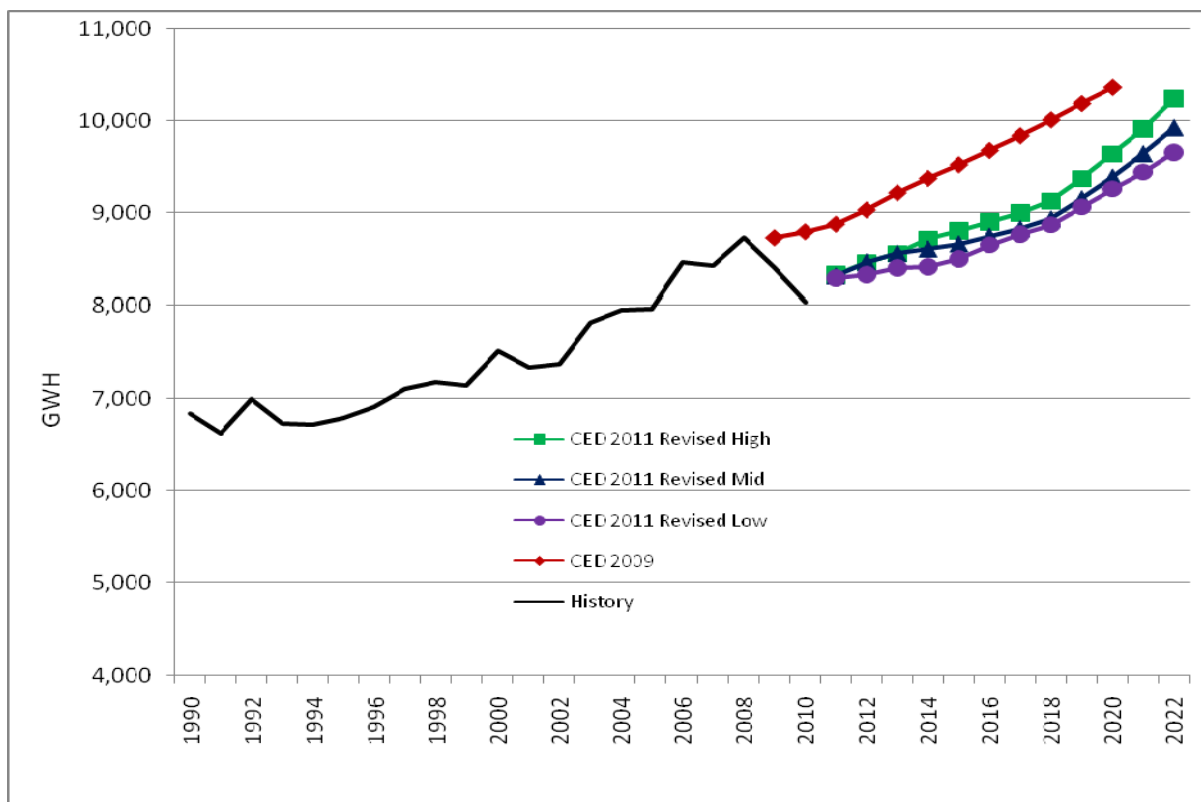
Source: California Energy Commission, 2012

Sector Level Results and Input Assumptions

Residential

Figure 5-6 compares the *CED 2011 Revised* and *CED 2009* LADWP planning area residential forecasts. *CED 2011 Revised* is lower than *CED 2009* over the entire forecast period for all scenarios due to the recent economic decline, although the growth rates for all three scenarios are higher. The higher growth rates are due to a higher projected growth rate in the number of households for each scenario compared to *CED 2009*, and higher income growth in the mid and high cases. The lower revised forecast is primarily due to the lower starting value in 2010, which was a historically cool year and led to lower than usual consumption.

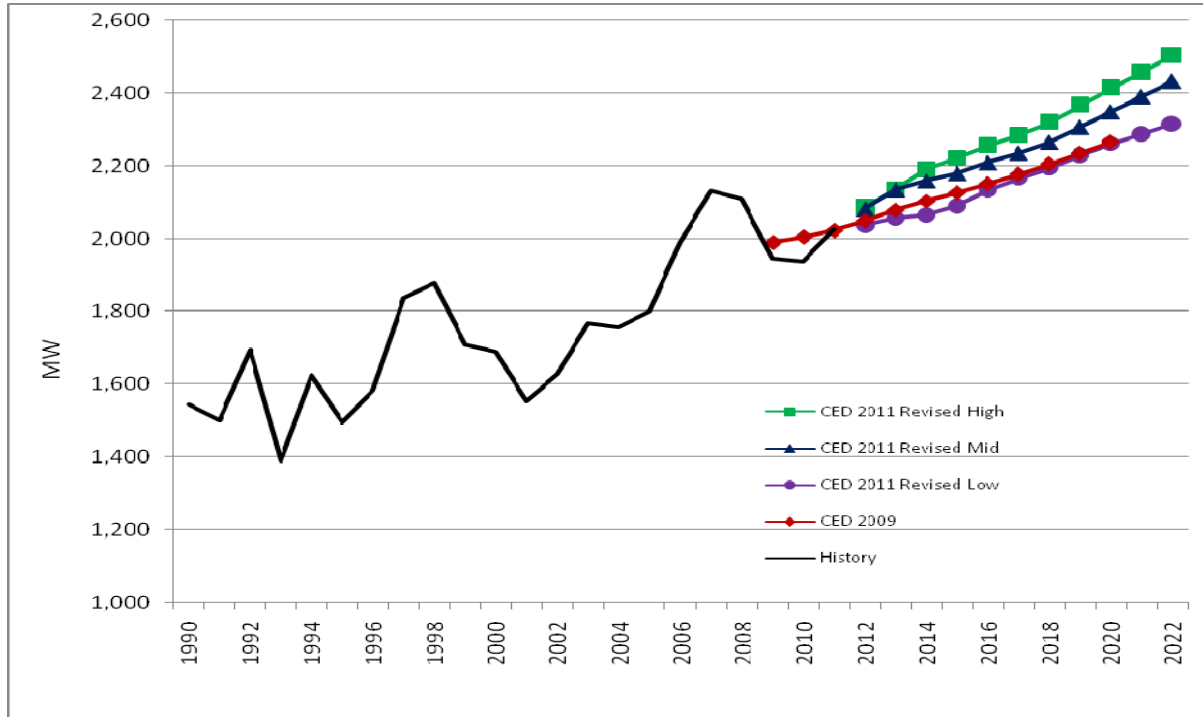
Figure 5-6: LADWP Planning Area Residential Consumption



Source: California Energy Commission, 2012

Figure 5-7 compares *CED 2011 Revised* and *CED 2009* residential peak demand forecasts. Growth in peak demand is higher in the mid and high case scenarios throughout the forecast period and after 2015 in the low case. The higher growth rates compared to *CED 2009* happen for the same reasons as consumption, in addition to the adjustment for climate change.

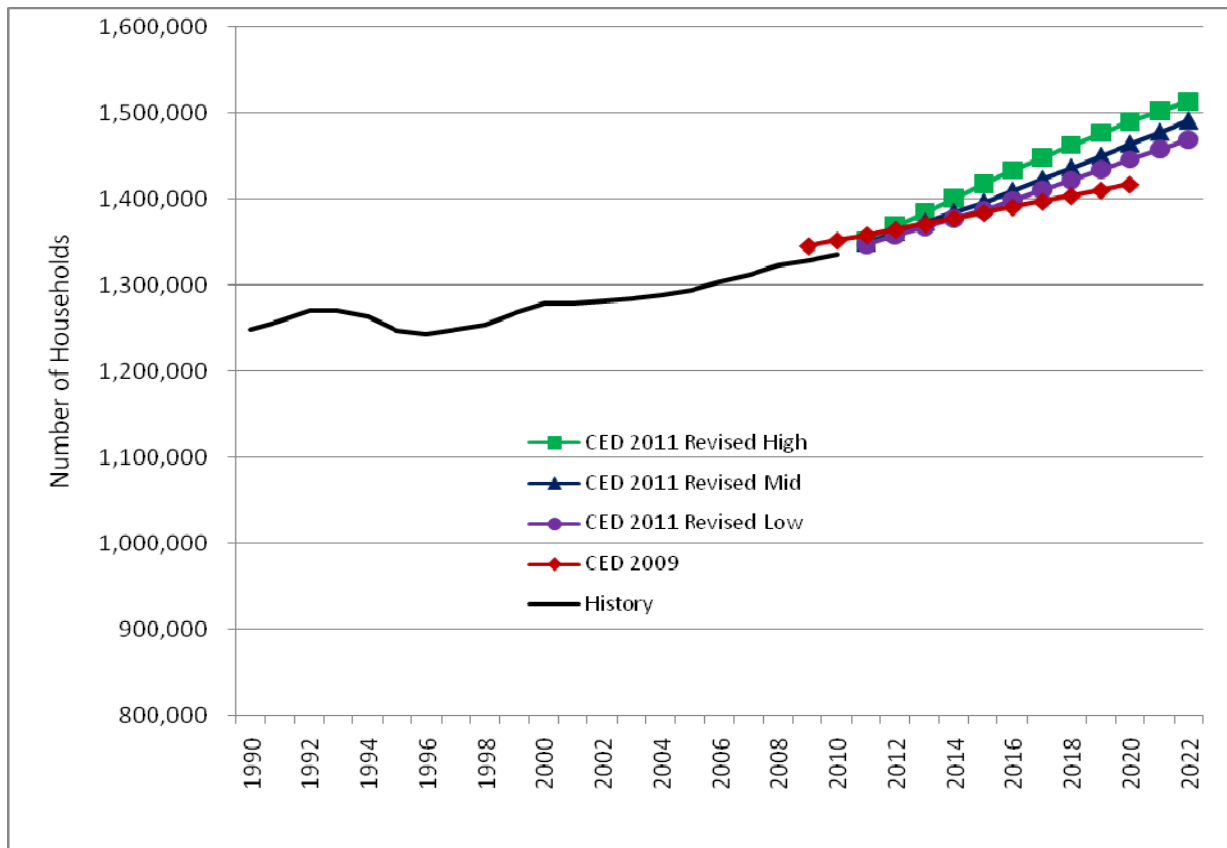
Figure 5-7: LADWP Planning Area Residential Peak



Source: California Energy Commission, 2012

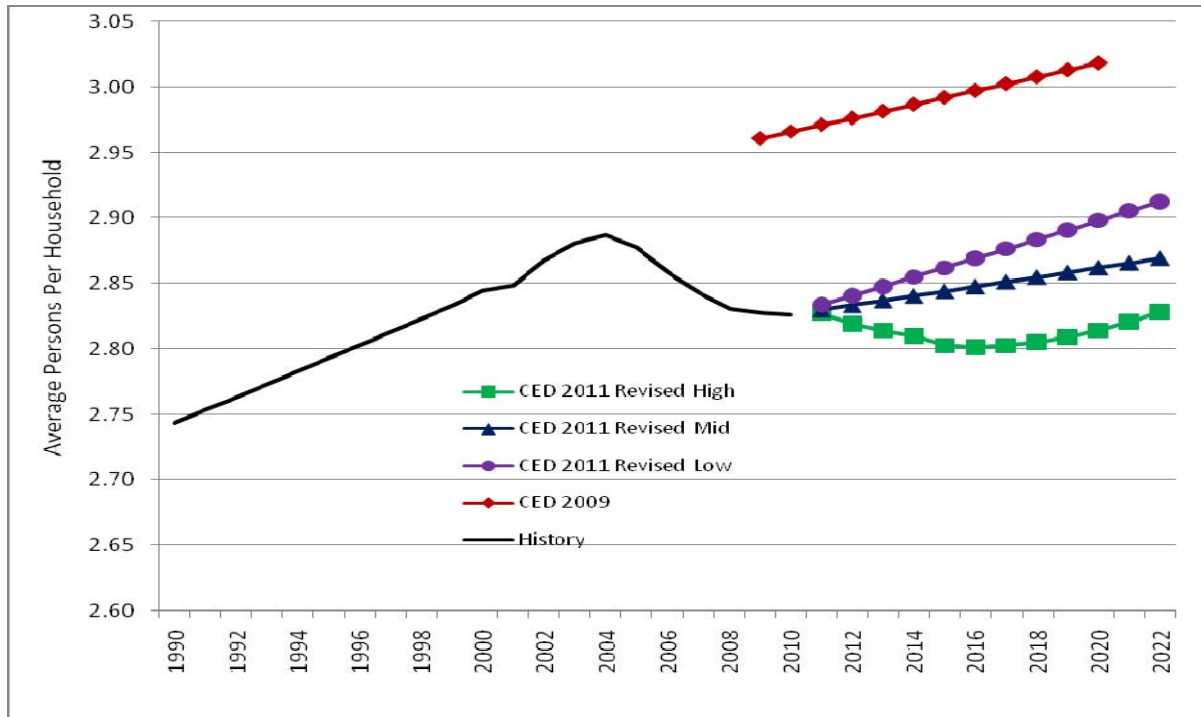
Figure 5-8 below and **Figure 5-9** on the next page compares the residential economic/demographic drivers used in *CED 2011 Revised* with drivers used in *CED 2009*. **Figure 5-8** compares total households. **Figure 5-9** compares persons per household projections. *CED 2011 Revised* projected number of households is higher than *CED 2009* in all three scenarios after 2015, although beginning at a lower level in 2011. See Chapter 1 of Volume 1 for a description of the scenarios for persons per household.

Figure 5-8: LADWP Planning Area Residential Household Projections



Source: California Energy Commission, 2012

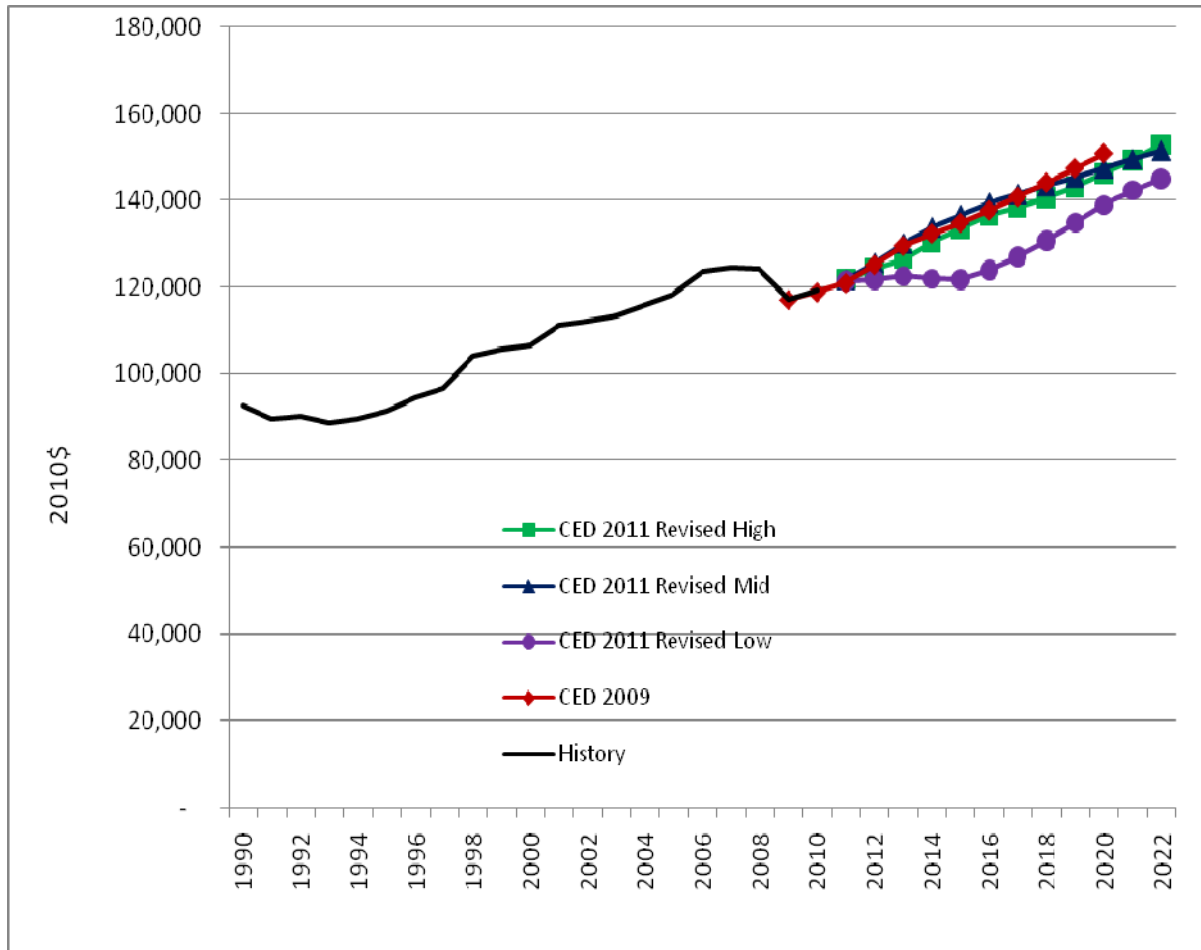
Figure 5-9: LADWP Planning Area Persons per Household Projections



Source: California Energy Commission, 2012

Figure 5-10 compares average household income between the two forecasts. The low case scenario is lower than the *CED 2009* forecast throughout the forecast period, although the gap becomes smaller around 2015. The mid and high scenarios of *CED 2011 Revised* are similar to the *CED 2009* forecast though the growth rates for both scenarios fall below *CED 2009* toward the end of the forecast period.

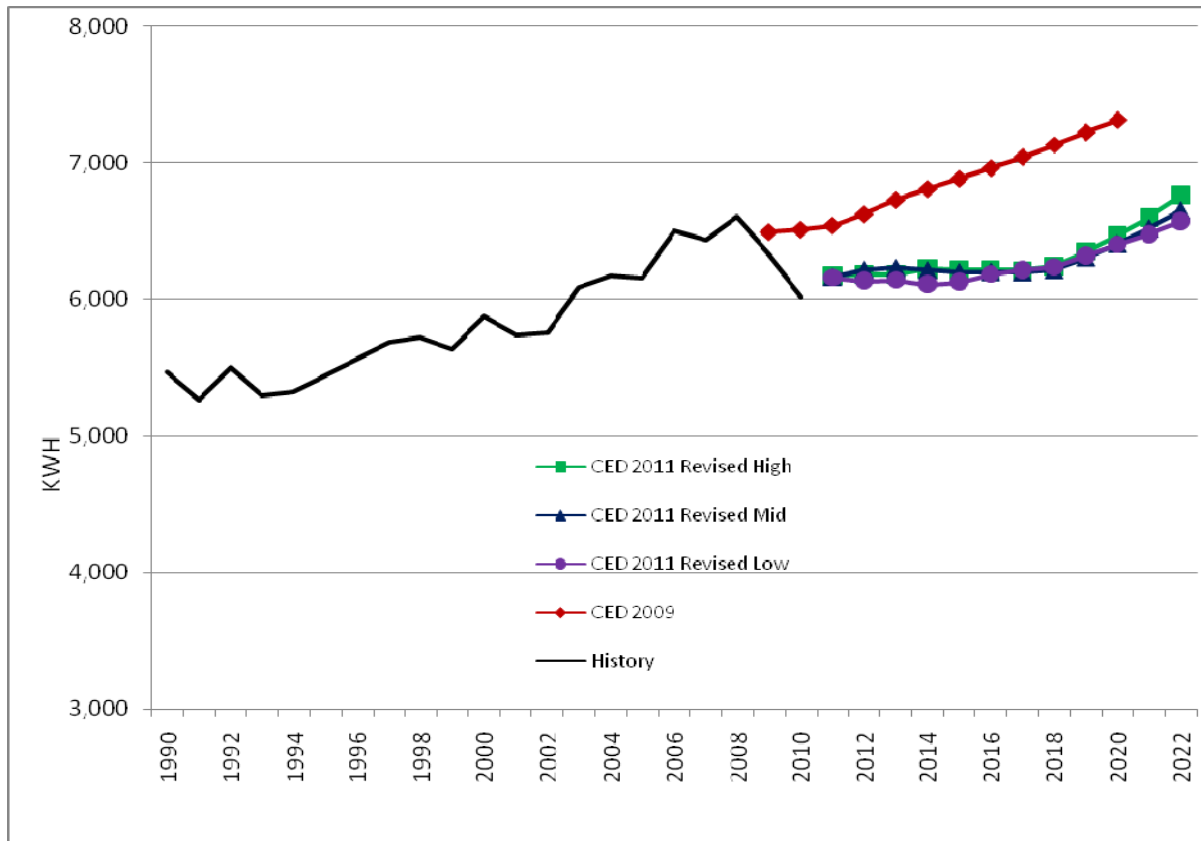
Figure 5-10: LADWP Planning Area Average Household Income Projections



Source: California Energy Commission, 2012

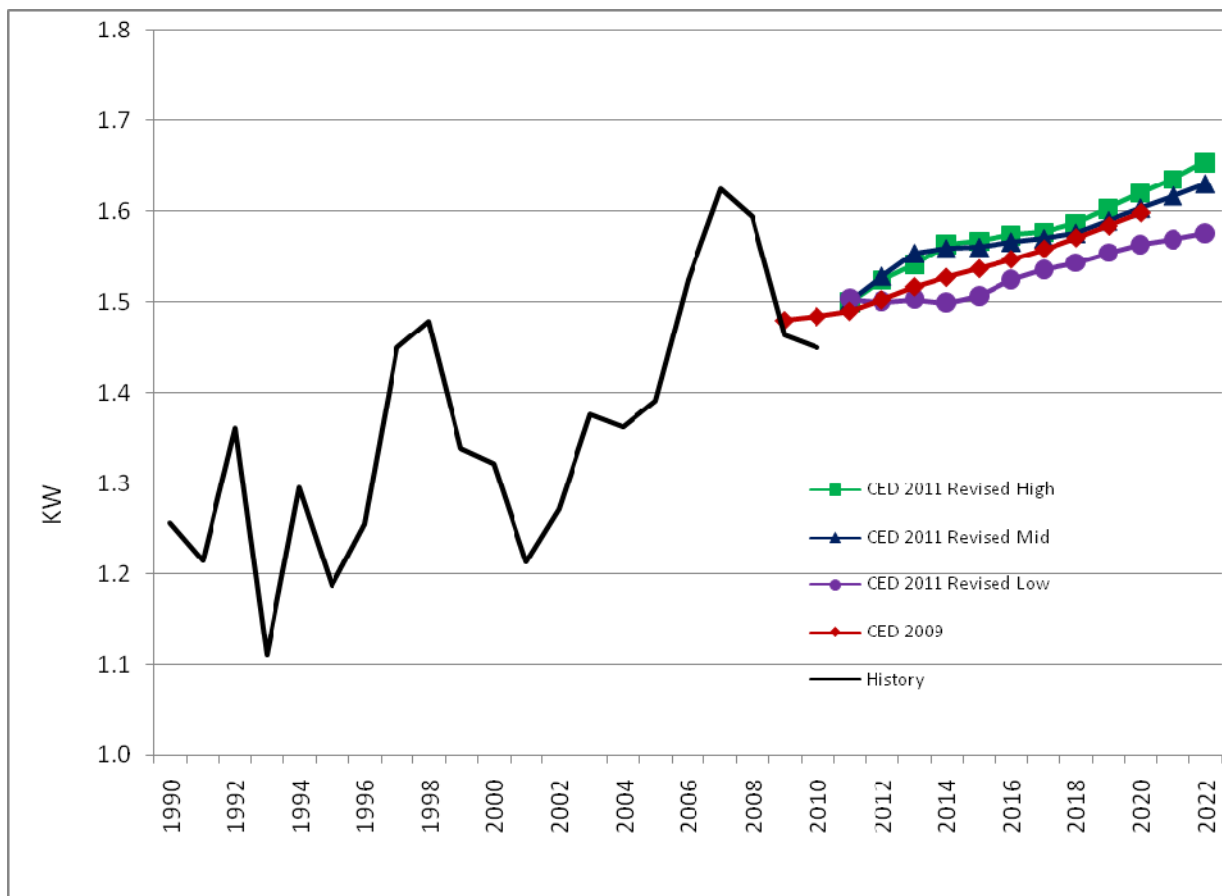
Figure 5-11 compares electricity consumption per household between the two forecasts as well as the 1990–2010 historical series. *CED 2011 Revised* use per household grows similarly to the *CED 2009* forecast in the later forecast years, although it begins from a lower level due to the lower consumption forecast. Peak use per household begins at a slightly higher point than *CED 2009*, as seen in **Figure 5-12** on the next page, but the low case scenario declines to below the *CED 2009* level and has a slower growth rate throughout the forecast period. The mid and high case scenarios have higher growth rates in early years but later decrease to *CED 2009* rates.

Figure 5-11: LADWP Planning Area Electricity Consumption per Household



Source: California Energy Commission, 2012

Figure 5-12: LADWP Planning Area Peak Use per Household

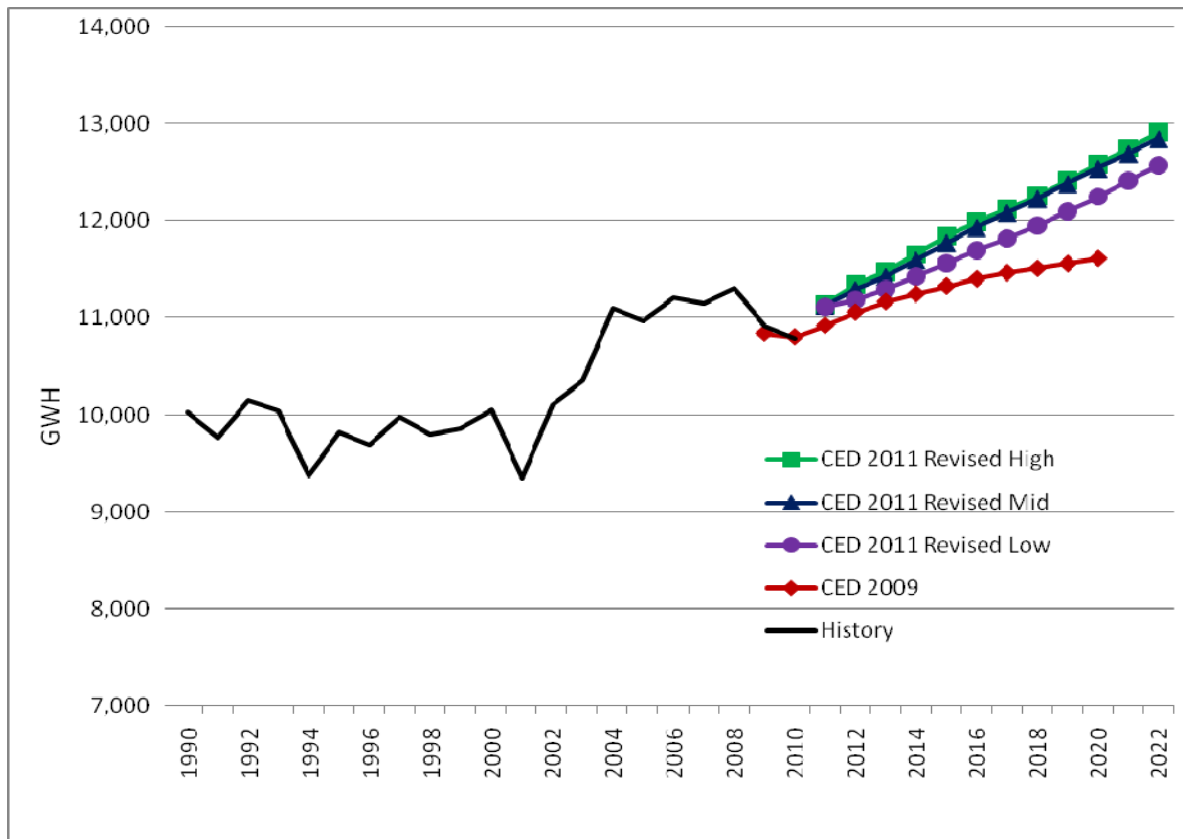


Source: California Energy Commission, 2012

Commercial Sector

Figure 5-13 compares the commercial sector forecasts. *CED 2011 Revised* begins slightly above the *CED 2009* forecast and grows at a faster rate in all three scenarios. This is due to higher projected population growth, which directly affects commercial floor space. *CED 2011 Revised* begins in 2011 at a much higher level than actual consumption in 2010. This is the result of the historically cool weather in Southern California in 2010, which led to low consumption for the year.

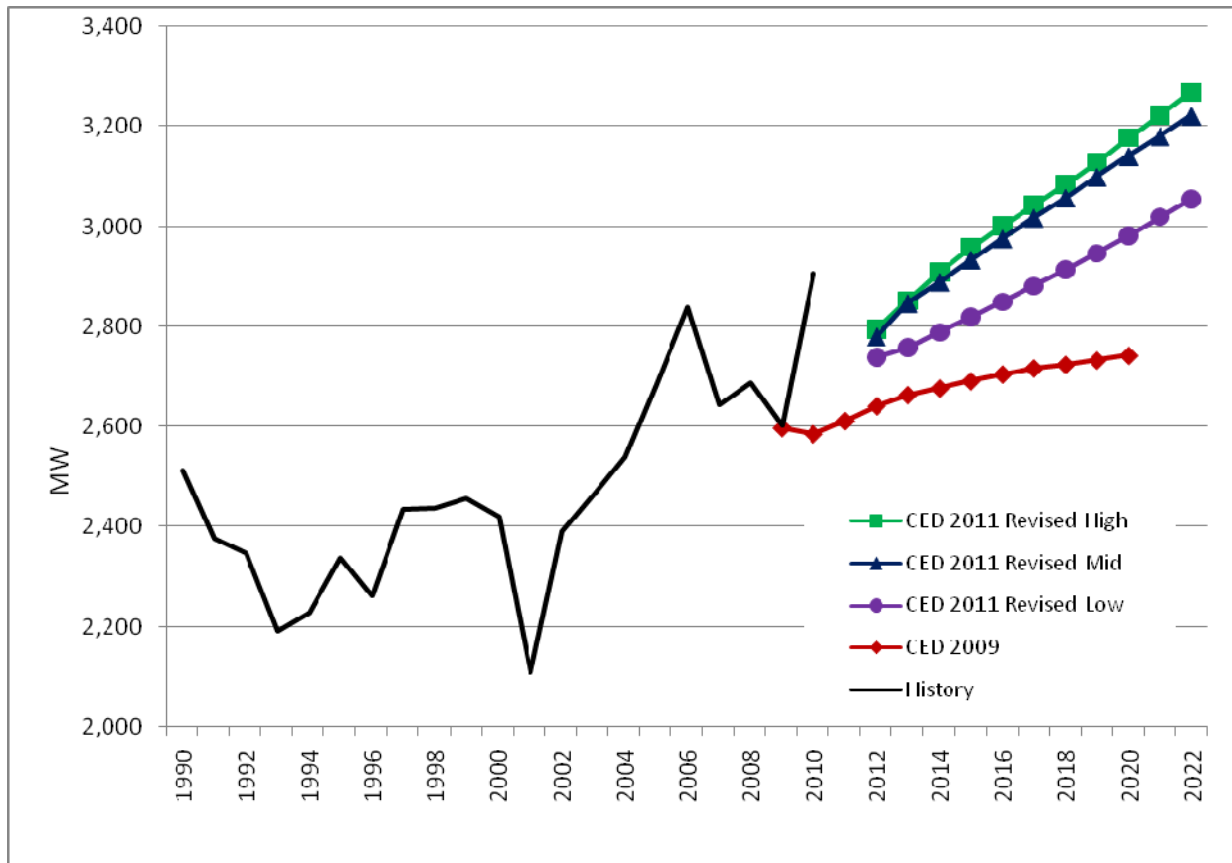
Figure 5-13: LADWP Planning Area Commercial Consumption



Source: California Energy Commission, 2012

Figure 5-14 compares the commercial peak demand forecasts. As with consumption, *CED 2011 Revised* forecasted peak grows at a faster rate than *CED 2009* for all three scenarios, and for the same reasons, in addition to the climate change adjustment.

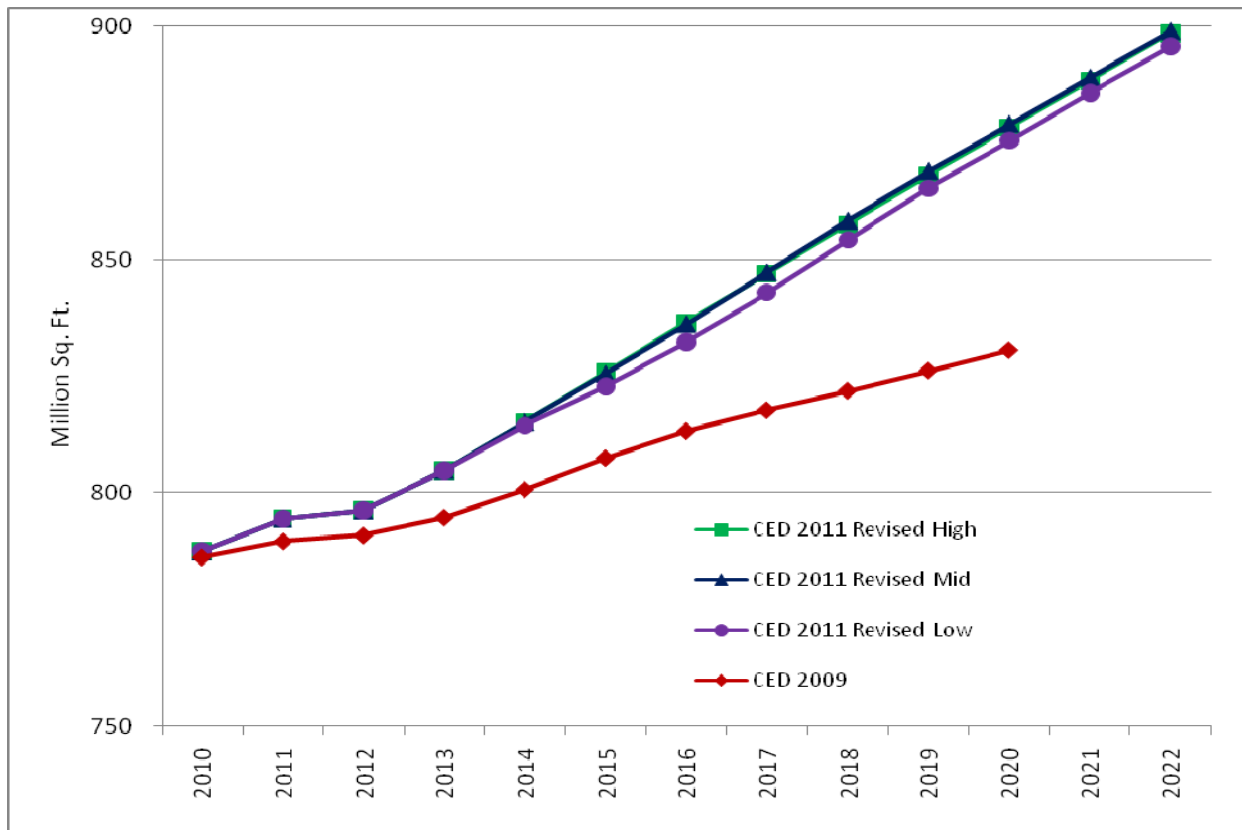
Figure 5-14: LADWP Planning Area Commercial Sector Peak



Source: California Energy Commission, 2012

In staff's commercial building sector forecasting model, floor space by building type (for example, retail, offices, schools, and hospitals) is the key driver of electricity consumption growth. **Figure 5-15** compares total commercial floor space projections. The *CED 2011 Revised* floor space projections are higher than those used in *CED 2009*. This is due to higher projected population growth. The three floor space scenarios do not vary significantly, reflecting the importance of population, which does not vary across the scenarios, in the floor space model.

Figure 5-15: LADWP Planning Area Projected Commercial Floor Space

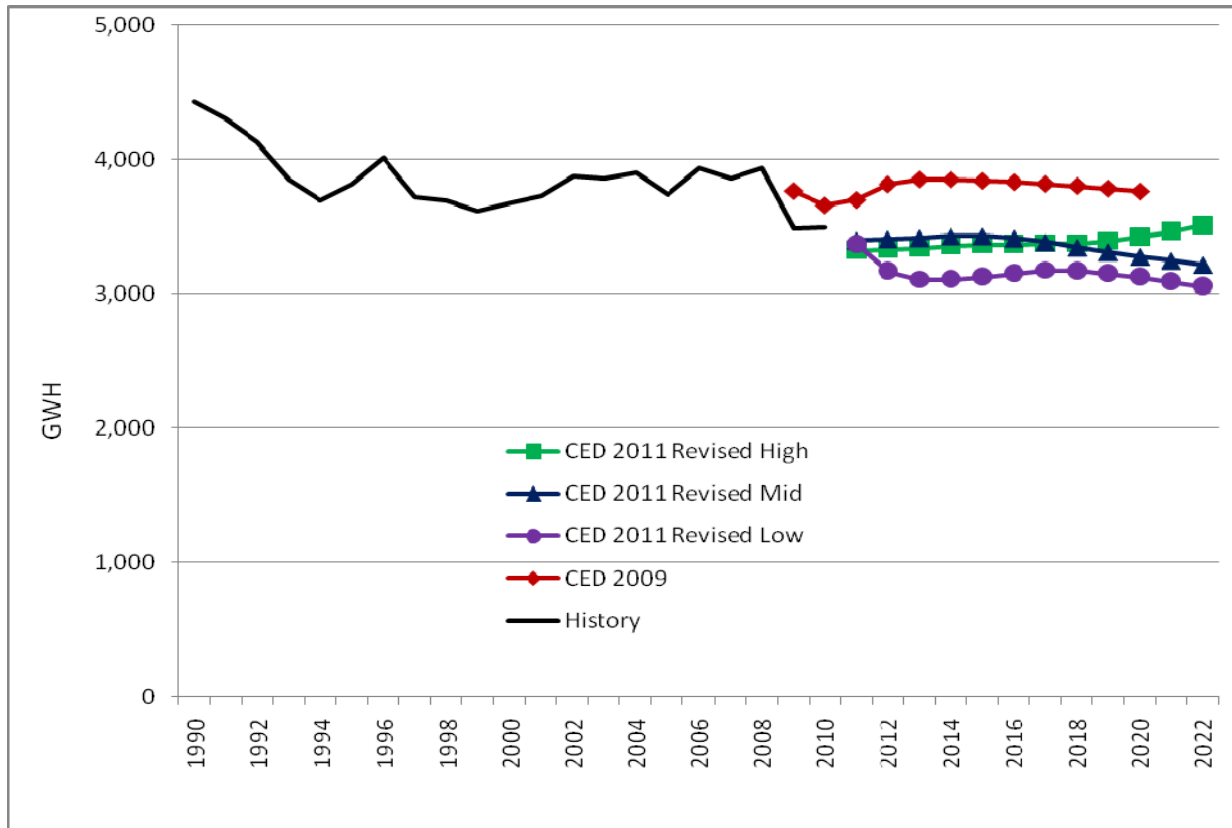


Source: California Energy Commission, 2012

Industrial Sector

Figure 5-16 compares the LADWP planning area industrial sector electricity consumption forecasts. The *CED 2011 Revised* industrial electricity consumption forecast begins at a lower level than the *CED 2009* forecast, due to consumption in 2009 and 2010 being lower than was previously forecast. The low and mid scenarios reflect a long-term decline with a similar growth rate to that of *CED 2009*, but growth in projected manufacturing output in the high scenario pushes industrial consumption up toward the end of the forecast period.

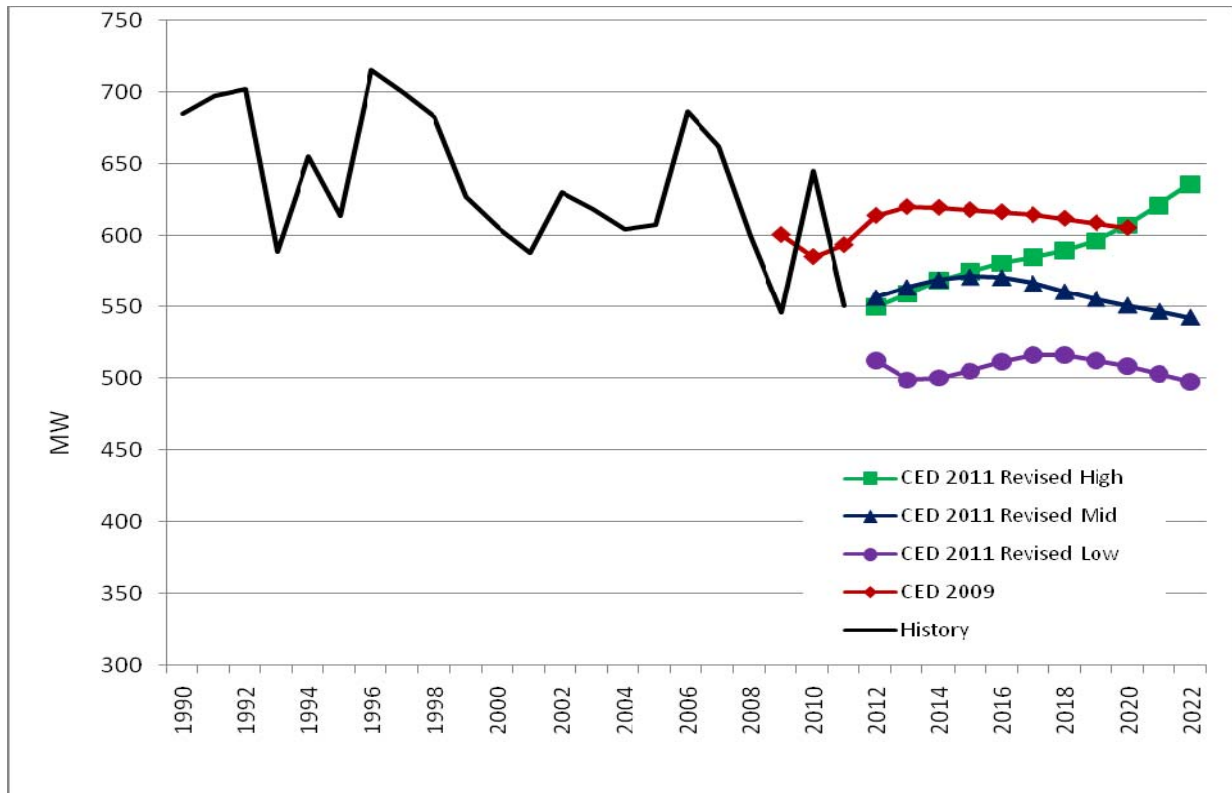
Figure 5-16: LADWP Planning Area Industrial Consumption



Source: California Energy Commission, 2012

Figure 5-17 compares the industrial sector peak forecasts. All three peak scenarios in *CED 2011 Revised* begin at a lower level than the *CED 2009* forecast for the same reason as described for consumption. The patterns for the low and mid scenarios mirror those for consumption, but the high scenario has strong growth due to the rapid increase in projected manufacturing output.

Figure 5-17: LADWP Planning Area Industrial Sector Peak



Source: California Energy Commission, 2012

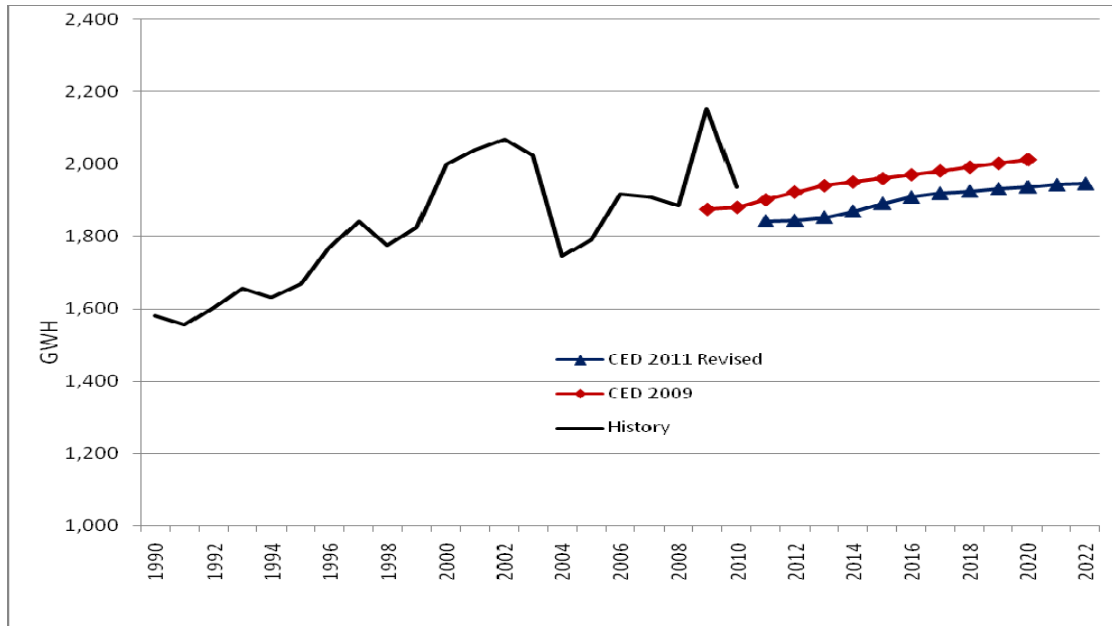
Other Sectors

Figure 5-18 and **Figure 5-19** both shown on the next page compares the remaining sector electricity consumption forecasts. **Figure 5-18** compares the transportation, communications, and utility (TCU) and street lighting sector forecasts. The *CED 2011 Revised* forecast starts from a lower point than the *CED 2009* forecast due to lower-than-expected consumption beginning in 2010, but its annual growth rate is similar to the previous forecast. The main driver of the TCU forecast is population, which does not vary by scenario, so only one demand case was developed for this sector.

Figure 5-19 compares the agriculture and water pumping sector forecasts. *CED 2011 Revised* has a faster growth rate than the *CED 2009* forecast in all three scenarios, with consumption in the high case exceeding *CED 2009* by 2016. The high scenario projection is 8 percent higher than the low scenario forecast by 2022. The large decrease in historical consumption

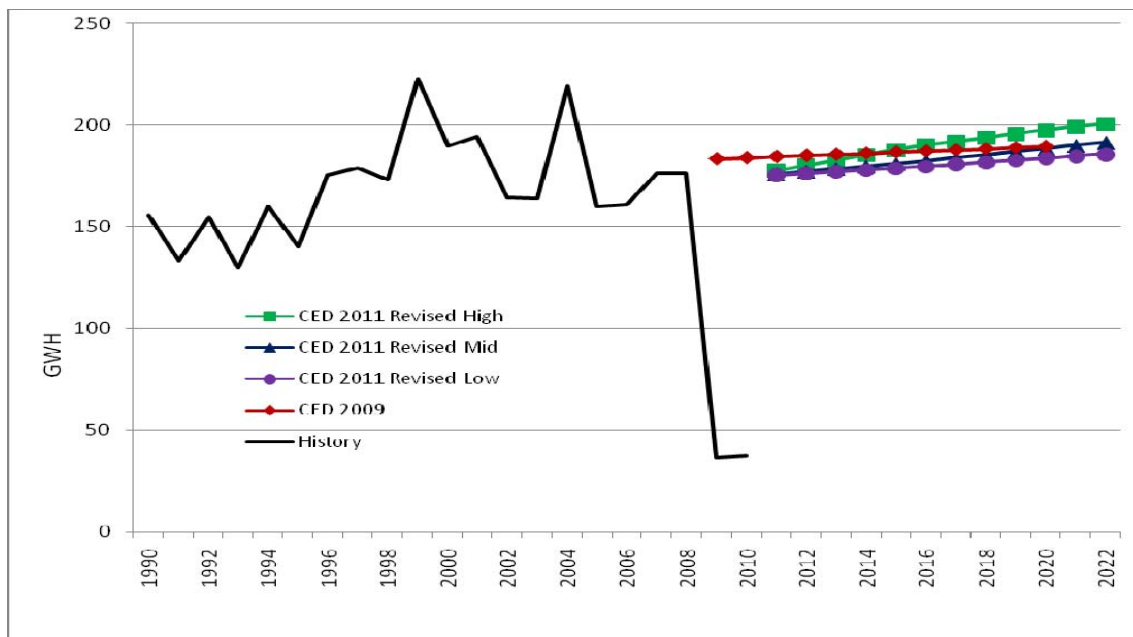
for 2009 and 2010 is likely the result of a QFER reporting problem, which staff will attempt to address for the final version of the *CED 2011* forecast.

Figure 5-18: LADWP Planning Area Transportation, Communication, and Utilities Sector Electricity Consumption



Source: California Energy Commission, 2012

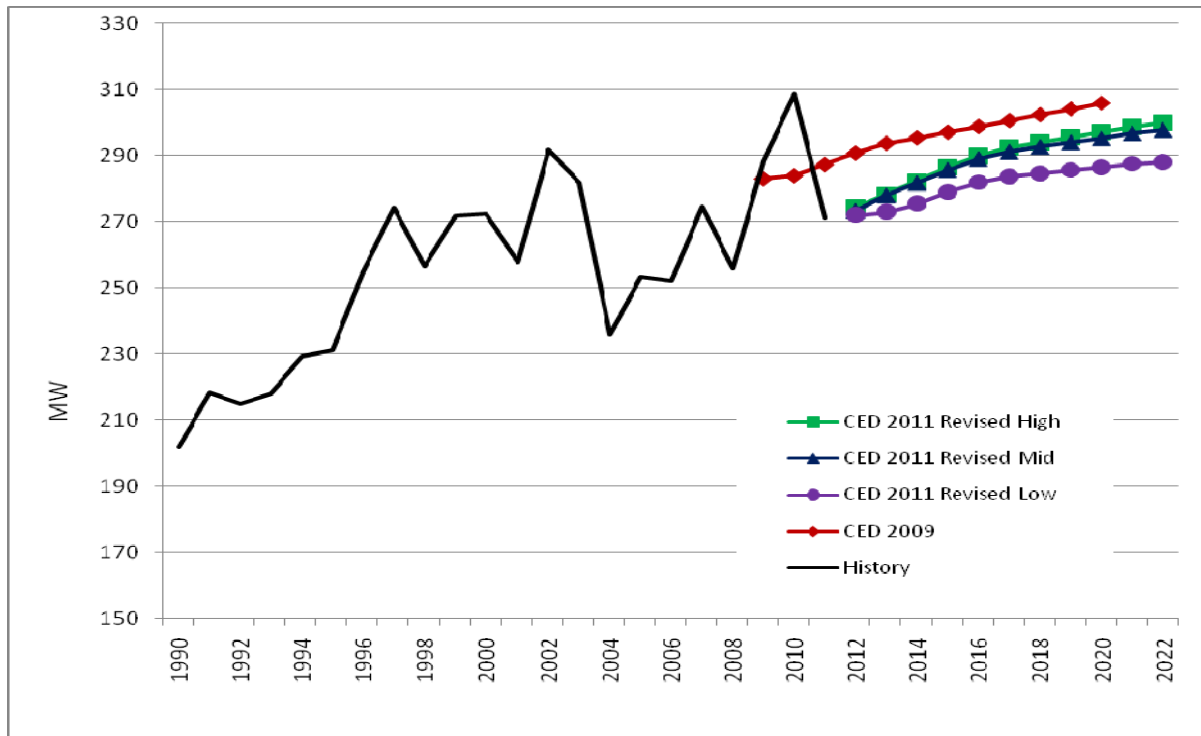
Figure 5-19: LADWP Planning Area Agriculture and Water Pumping Electricity Consumption Forecasts



Source: California Energy Commission, 2012

Figure 5-20 compares the combined “other” sector peaks for the *CED 2011 Revised* and *CED 2009* forecasts. *CED 2011 Revised* grows at essentially the same rate as *CED 2009* in all three scenarios but begins at a lower point due to a lower-than-expected peak in 2010.

Figure 5-20: LADWP Planning Area Other Sector Peak

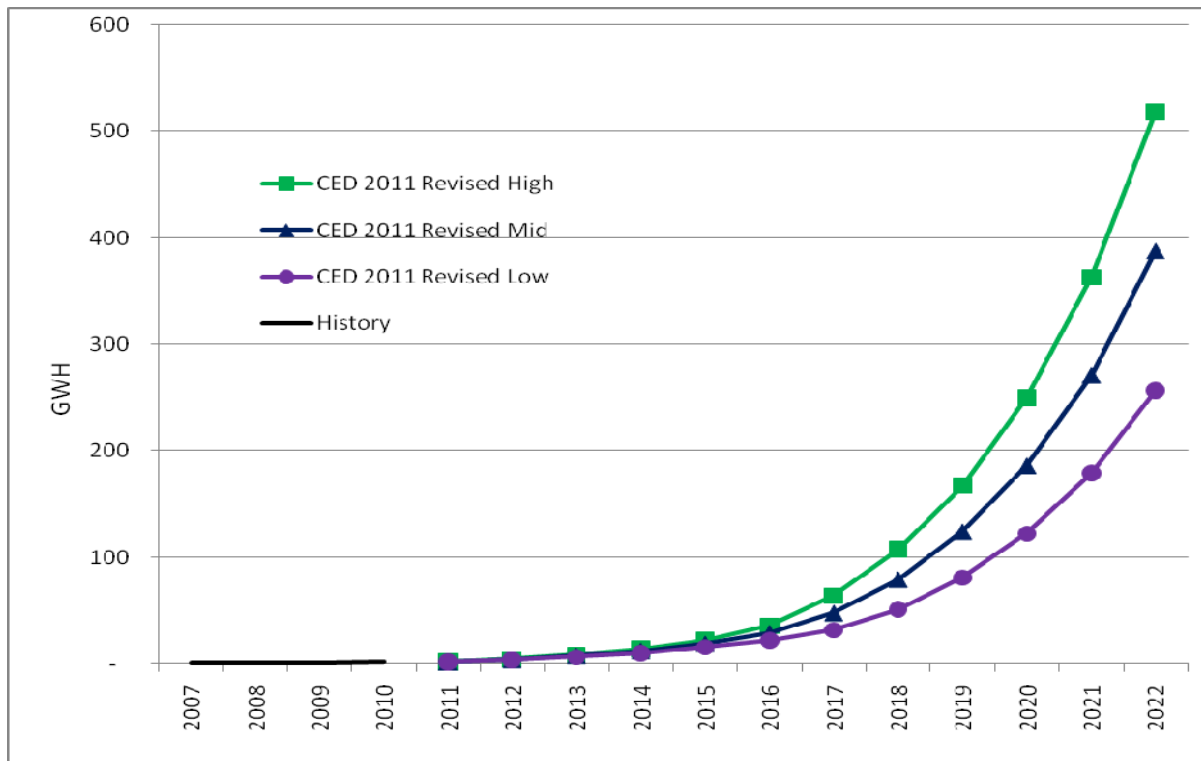


Source: California Energy Commission, 2012

Electric Vehicles

Figure 5-21 shows projected electricity consumption from electric vehicles. Since existing electric vehicle use is included in QFER consumption data, projected consumption and peak demand incremental to 2010 usage was added to the sector model results. For the LADWP planning area, consumption by electric vehicles is expected to grow from around 2 GWh in 2011 to more than 500 GWh in the high case by 2022. Recharging is assumed to occur mainly during off-peak hours, resulting in relatively low peak impacts. By 2022, electric vehicles are expected to contribute an additional 11 MW of peak demand in the low demand scenario and 22 MW in the high scenario.

Figure 5-21: LADWP Planning Area Electric Vehicle Consumption



Source: California Energy Commission, 2012

Self-Generation

As shown in **Table 5-2**, the peak demand forecast is reduced by self generation, including the effects of the SGIP, CSI, and other programs, as discussed in Volume 1. The effects of these programs are forecast based on recent trends in installations and a predictive model for the residential sector. Staff projects about 55 MW of peak reduction from photovoltaic (PV) installation in the mid case by 2022. Peak reductions are based on installed PV system capacities of 138 MW by 2022 in the high demand case and 146 MW by 2022 in the low demand case.

Table 5-2: LADWP Planning Area Self-Generation Peak Forecasts

	1990	2000	2010	2015	2020	2022
Non-PV Self-Generation	148.50	196.70	215.57	215.62	215.68	215.73
PV, Low Demand	0.00	0.22	14.90	31.41	46.57	56.83
PV, Mid Demand	0.00	0.22	14.90	31.07	45.12	54.63
PV, High Demand	0.00	0.22	14.90	30.80	44.35	53.59
Total Self-Generation, Low Demand	148.50	196.91	230.47	247.03	262.25	272.56
Total Self-Generation, Mid Demand	148.50	196.91	230.47	246.69	260.79	270.37
Total Self-Generation, High Demand	148.50	196.91	230.47	246.42	260.03	269.32

Source: California Energy Commission, 2012

Conservation/Efficiency Impacts

Table 5-3 shows electricity consumption and peak savings estimates for building and appliance standards for the mid demand scenario. Total standards impacts are higher in the high demand case by 1.5-2.0 percent because of an increased level of home construction and commercial floor space, and 1.5-2.0 percent lower in the low demand case. Chapter 3 of Volume 1 provides more detail on staff work related to energy efficiency and conservation.

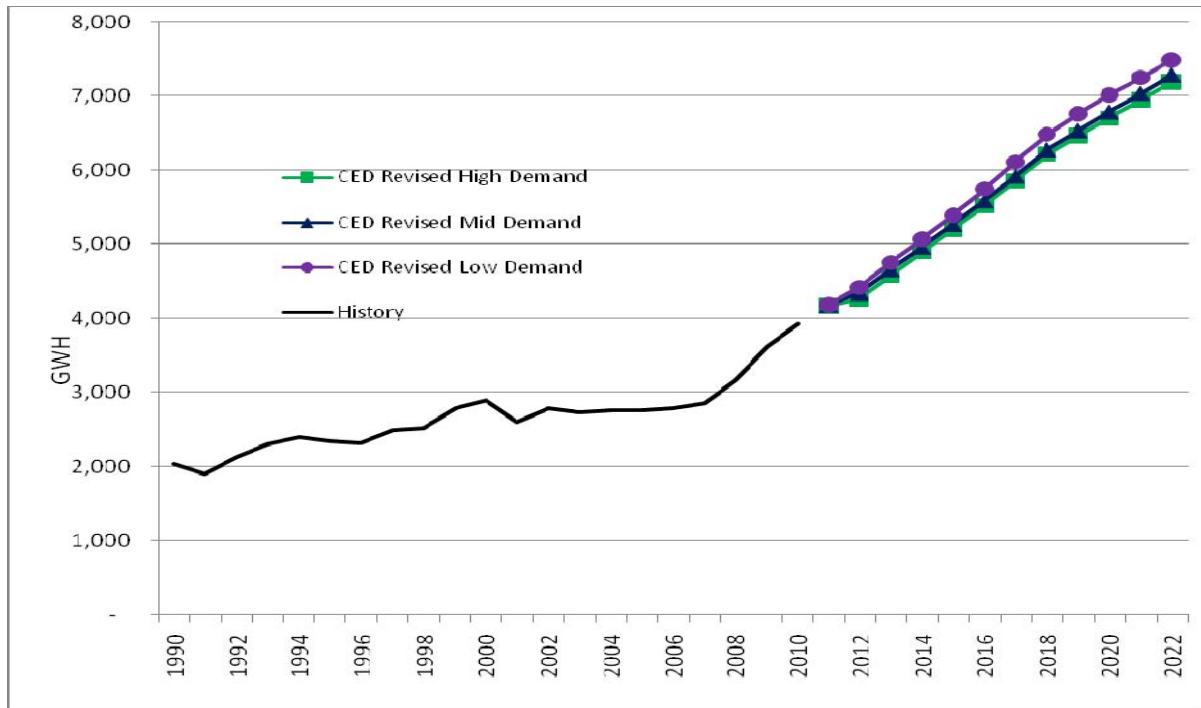
Table 5-3: LADWP Planning Area Electricity Savings Estimates From Standards, Mid Demand Scenario

Electricity Consumption Savings (GWh)							
	Residential			Commercial			
	Building Standards	Appliance Standards	Total	Building Standards	Appliance Standards	Total	Total Standards
1990	318	220	538	128	87	215	754
2000	414	683	1,097	267	187	454	1,552
2010	278	1,346	1,624	504	324	829	2,453
2015	371	2,072	2,443	722	475	1,196	3,640
2020	467	2,638	3,105	997	699	1,696	4,801
2022	497	2,740	3,236	1,104	743	1,847	5,083
Electricity Peak Demand Savings (MW)							
	Residential			Commercial			
	Building Standards	Appliance Standards	Total	Building Standards	Appliance Standards	Total	Total Standards
1990	72	50	122	32	22	54	176
2000	93	154	247	64	45	109	356
2010	67	324	391	136	87	223	615
2015	93	521	615	180	118	298	913
2020	117	660	777	250	175	425	1,201
2022	122	671	793	277	186	463	1,256

Source: California Energy Commission, 2012

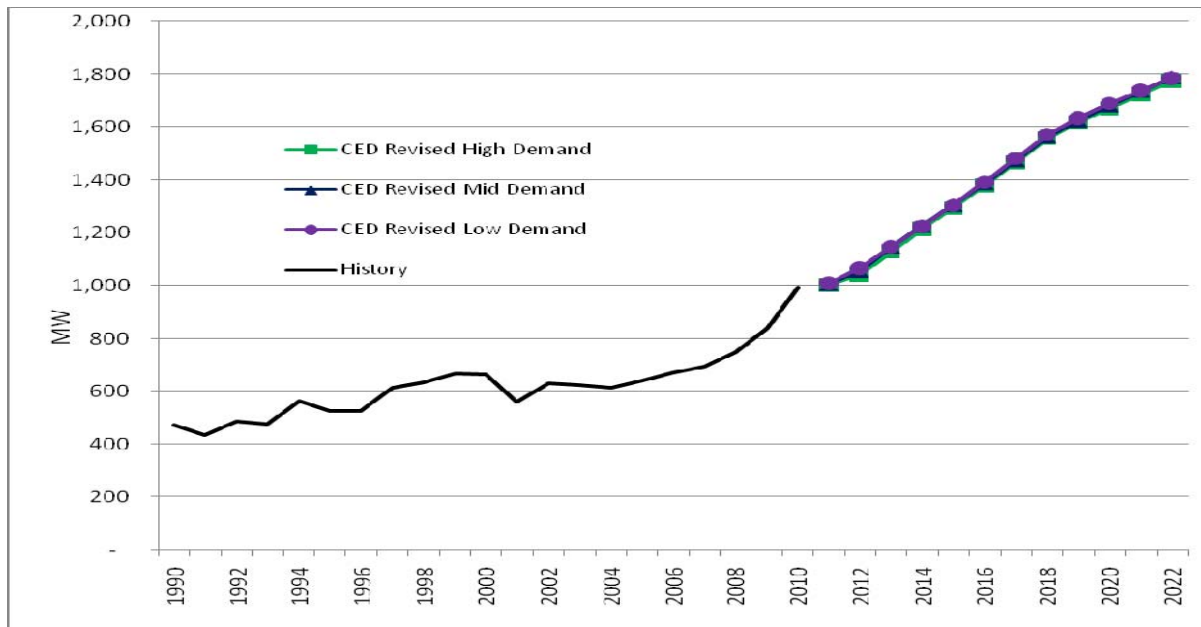
Figure 5-22 and **Figure 5-23** both depicted on the next page show forecasts of total savings impacts on electricity and peak demand, from all committed sources, including building and appliance standards; utility and public agency programs implemented before 2013; and price and other effects, or savings associated with rate changes and certain market trends not directly related to programs or standards. Savings are measured against a 1975 baseline, so they incorporate more than 30 years of impacts from rate changes and standards. Projected savings impacts are higher the lower the demand scenario, since price and program effects are inversely related to the demand outcome. Peak results show less difference among the scenarios, since residential consumption savings totals are very similar and the residential sector has a disproportionately large effect on peak demand.

Figure 5- 22: LADWP Planning Area Electricity Consumption Savings Estimates



Source: California Energy Commission, 2012

Figure 5- 23: LADWP Planning Area Electricity Peak Savings Estimates



Source: California Energy Commission, 2012

GLOSSARY

Acronym	Definition
AB 2021	Assembly Bill 2021
CED	California Energy Demand
CPUC	California Public Utilities Commission
CSI	California Solar Initiative
DOF	Department of Finance
<i>EAP</i>	Energy Action Plan
Energy Commission	California Energy Commission
ERP	Emerging Renewables Program
ESP	Electric Service Provider
GW/GWh	Gigawatt/gigawatt hours
<i>IEPR</i>	Integrated Energy Policy Report
IID	Imperial Irrigation District
IOU	Investor-owned utility
ISO	Independent System Operator
KW/KWh	Kilowatt/Kilowatt hours
LADWP	Los Angeles Department of Water and Power
LSE	Load serving entity
MW/MWh	Megawatt/megawatt hours
NSHP	New Solar Homes Partnership
PG&E	Pacific Gas & Electric Company
PV	Photovoltaic
QFER	Quarterly Fuel Energy Reporting
SCE	Southern California Edison Company
SDG&E	San Diego Gas & Electric Company
SGIP	Self-Generation Incentive Program
SMUD	Sacramento Municipal Utility District
SCG	Southern California Gas Company
TCU	Transportation, communications, and utility sector
WAPA	Western Area Power Administration

